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COLLECTIVE REVIEW

THE COURSE OF HYPERTENSION AFTER NEPHRECTOMY FOR ADVANCED UNILATERAL RENAL DISEASE

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IT is now more than 8 years since Butler reported successful treatment of hypertension in 2 children by nephrectomy for advanced unilateral pyelonephritis, and since Walters and one of us (Barker) reported a similar result after removal of a kidney seriously damaged by chronic atrophic pyelonephritis in an adult. Since that time there have been a number of reports on the incidence of unilateral renal disease among patients who had hypertension and on the results of removal of the affected kidney. It is apparent that excellent results have followed nephrectomy in some cases, and that there has been no effect on the hypertension in others.

For a patient whose primary complaints or symptoms are definitely related to an advanced "surgical" lesion of one kidney and who has incidental hypertension, the immediate therapeutic problem is simple, since nephrectomy probably would be necessary whether or not hypertension was present.

However, in the treatment of a patient whose presenting problem is hypertensive disease and who does not have symptoms or physical signs suggestive of localized renal disease, the internist and urologist are confronted with two questions. First, should a urographic examination be made? Second, if it is made and if local or diffuse disease of one kidney is found, should the patient be subjected to nephrectomy primarily as treatment for the hypertension?

The incidence of so-called surgical renal lesions in cases of hypertension was at first considered to be high, some observers stating that the lesions occurred in approximately 40 per cent of cases. It soon became apparent, however, that in some cases of hypertension minor lesions of the kidney were found which were coincidental and not etiologic factors. This group included such renal lesions as ptosis, pyelectasis of slight or moderate degree, urinary infection, and renal lithiasis, without significant renal destruction. It has also become apparent that significant lowering of blood pressure rarely has followed nephrectomy unless the kidney was badly diseased as the result of either chronic infection, such as occurs in the presence of atrophic pyelonephritis and severe hydronephrosis or extensive chronic renal tuberculosis. Even when such advanced lesions of the kidney have been found in patients who have hypertension, the effect on the blood pressure of removal of the involved kidney has been rather variable.

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There are many factors involved in determining the exact incidence of surgical renal lesions associated with hypertension, and the incidence is difficult if not impossible to determine. A previous review (2) of a large series of cases of hypertension, in which careful urologic studies were made at the Mayo Clinic, showed that renal lesions amenable to surgical treatment occurred in less than 1 per cent of patients who had hypertension. In reviewing our cases of hypertension with renal lesions, this approximate incidence would seem to be corroborated.

In the sifting out of renal lesions in cases of hypertension, the most valuable single method of diagnosis is the excretory urogram. The urogram usually will make visible the existence of a renal lesion which may be surgical. Generally, other data will be required to complete the diagnosis. No diagnostic method is available which will offer specific data as to whether or not hypertension would be eliminated if the kidney were removed. The question has been raised as to whether an excretory urogram should be made routinely in every case of hypertension. It has been our practice to make excretory urograms for hypertensive patients who (1) give a history of disease of the urinary tract, (2) have microscopic hematuria or pyuria, or other manifestations suggesting disease of the urinary tract, or (3) are less than 20 years of age, if no other cause for hypertension is apparent, such as coarctation of the aorta. We have made excretory urograms for a great many other patients with hypertension who could not have been included in the above groups, but not for all, and it is possible that in a few cases, hypertension of renal etiology was overlooked. We have felt that excretory urograms are not of value for patients with hypertension who are more than 60 years of age or for those who have definite azotemia.

One of the most difficult problems in cases of hypertension has been to determine whether a renal lesion detected in the course of clinical examination of a patient with hypertension could be an etiologic factor or was merely coincidental. All the clinical data in such cases have been carefully weighed in the decision as to the advisability of surgical treatment. In many cases the hypertension was known to have existed for many years, and the possibility of renal etiology seemed minimal. In other cases the renal lesion was of such a minor type that it was very evidently coincidental, and could not possibly have been an etiologic factor. In a few selected cases, although the renal lesion seemed to be a questionable etiologic factor, surgical treatment was advised. Where there was a very definite renal lesion which might well be an etiologic factor, operation was, of course, always advised. In the course of routine examination many instances of advanced hypertension with definite surgical lesions of the kidney were observed, but because of the patient's general condition, or because of clinical evidence of bilateral renal disease, performance of renal surgery was not advisable.

POSTOPERATIVE COURSE OF HYPERTENSION AFTER RENAL SURGERY

This report is based on a review of 61 cases. All the patients came to the Mayo Clinic primarily because of hypertension. All were found to have advanced disease of one kidney and minimal, if any, evidence of disease in the other kidney. All underwent removal of the diseased kidney. There were no deaths in the hospital during the postoperative convalescence. Blood pressures were checked several times from 2 to 4 weeks after nephrectomy to determine the immediate effects of nephrectomy on the hypertension. Blood pressures were checked again 2 to 4 years after nephrectomy, either during a subsequent examination of the patient at the clinic or by the patient's home physician. Thirty-two patients, or slightly more than half of the total number, were examined 5 or more years after nephrectomy. The remainder either could not be traced or insufficient time had elapsed since nephrectomy in which to permit a 5 year follow-up study. Results have been graded as follows: *Good*—if blood pressures, expressed in millimeters of mercury, were 150 systolic and 100 diastolic, or less; *Fair*—if blood pressures were significantly reduced, but still were above 150 systolic and 100 diastolic; *Poor*—if there was no significant effect on the blood pressure; and *Death*—if patients died during

TABLE I.—POSTOPERATIVE RESULTS: 61 HYPERTENSIVE PATIENTS WHO UNDERWENT UNILATERAL NEPHRECTOMY

Result	Time after operation		
	Immediately (2 to 4 weeks)	Two years plus	Five years plus*
Good	31	25	10
Fair	13	10	5
Poor	17	20	11
Death	0	6	6
Total	61	61	32

*Figures in this column based on 32 traced patients.

the period of the follow-up study. The results for the entire group are given in Table I.

In reviewing the results of operation it is interesting to note the comparative condition of the patient at different periods after the operation. When the blood pressure was taken within 2 to 4 weeks after operation, it was found that the result was either good or fair in 44 cases, or 72 per cent. However, when these patients were examined 2 years after operation, there were only 35 patients for whom the results were good or fair, or 57 per cent. Five years after operation the number of patients whose condition was described as good or fair was only 15, or 47 per cent of the 32 who were followed for that period (Table I).

Attention has been called previously to the fact that an estimate of results of renal surgery for hypertension cannot be exact unless the patients are examined as late as 2 years after operation. It was thought that if the patient's condition is satisfactory at that time, the chances are that the benefit will be permanent. However, the reduction in the percentage of good results at the end of 5 years in comparison with the percentage of good results 2 years after operation shows that this assumption was fallacious. In other words, even though elimination of the kidney has a very definite effect in lowering blood pressure immediately after the operation and as long as 2 years after operation, other factors may arise to cause a return of hypertension. The comparatively temporary removal of the etiologic factor in hypertension by renal surgery was not fully appreciated. That factors remain

TABLE II.—POSTOPERATIVE RESULTS: 29 PATIENTS WHO HAD RENAL ATROPHY AND FIBROSIS AMONG 61 HYPERTENSIVE PATIENTS WHO UNDERWENT UNILATERAL NEPHRECTOMY

Result	Time after operation		
	Immediately (2 to 4 weeks)	Two years plus	Five years plus*
Good	12	10	4
Fair	5	5	3
Poor	12	11	5
Death	0	3	3
Total	29	29	15

*Figures in this column based on 15 traced patients.

which may reassert themselves after the immediate benefit of renal surgery has elapsed must be admitted. Nevertheless, the fact that the blood pressure of 15 patients was approximately normal 5 years after operation demonstrates conclusively that the diseased kidney which was removed was a definite etiologic factor in the hypertension. It is also evident that elimination of the etiologic factor of hypertension, as accomplished by nephrectomy, was in many cases of only temporary value and that an underlying factor existed which reasserted itself to permit a return of the hypertension.

Careful review of the 26 cases in which the results of operation were classified as "poor" or "death" revealed data which were of considerable interest. It was rather noticeable that in most cases in which there was evidence of some involvement of the opposite kidney, there was little or no reduction in hypertension after nephrectomy. Cicatricial deformity as shown in the urogram or in the outline of the "good" kidney is observed in many of these cases. In several cases there was less than normal function in the "good" kidney, as shown by the results of various clinical tests of renal function. Elevation of blood urea, even though moderate, retardation of the secretion of phthalein, or deficiency in clearance of urea, should constitute a warning against removal of one kidney as treatment for hypertension alone, unless there is renal pathologic change which urgently indicates nephrectomy. In fact, several patients with clinical

TABLE III.—POSTOPERATIVE RESULTS: 26 PATIENTS WHO HAD HYDRONEPHROSIS AMONG 61 HYPERTENSIVE PATIENTS WHO UNDERWENT UNILATERAL NEPHRECTOMY

Result	Time after nephrectomy		
	Immediately (2 to 4 weeks)	Two years plus	Five years plus*
Good	14	12	5
Fair	7	4	2
Poor	5	7	5
Death	0	3	3
Total	26	26	15

*Figures in this column based on 15 traced patients.

TABLE IV.—POSTOPERATIVE RESULTS: 6 PATIENTS WHO HAD RENAL TUBERCULOSIS AMONG 61 HYPERTENSIVE PATIENTS WHO UNDERWENT UNILATERAL NEPHRECTOMY

Result	Time after operation		
	Immediately (2 to 4 weeks)	Two years plus	Five years plus*
Good	5	3	1
Fair	1	1	0
Poor	0	2	1
Death	0	0	0
Total	6	6	2

*Figures in this column based on 2 traced patients.

or urographic evidence of disease in the "good" kidney were observed whose general condition became worse after nephrectomy. Roentgenograms showed minute areas of calcification or small stones in both kidneys in several cases. The well kidney had been subjected to previous operation for stone in 2 cases.

The group of cases in which there was a definite reduction in blood pressure, but not a return to normal, is interesting. In many of these the systolic blood pressure observed before nephrectomy was more than 200 millimeters of mercury, and the diastolic, 120. Five years later, although the blood pressure was reduced, it remained between 160 and 170 systolic, and between 90 and 100 diastolic. Associated with the reduction in blood pressure there was almost invariably an improvement in the patient's general condition and well-being. In the absence of any other form of treatment, it would be logical to assume that removal of the kidney was the differential factor. It would seem very probable that the reduction in blood pressure was caused by elimination of a pressor factor which had been present in the removed kidney. In several cases of severe hypertension, the blood pressure decreased almost to normal for a variable period after nephrectomy, but when the patient was observed 2 to 5 years later, a moderate increase in blood pressure was noted, but the pressure was at a much lower level than before the operation.

In a number of cases in which the results were classified as "poor" the hypertension remained at approximately the same level after nephrectomy, but the patient's general condition was very definitely improved. Some type of renal infection had been present in most of these cases, and it is evident that removal of this infection was the cause of improvement in the patient's general condition. From the standpoint of the hypertensive disease, it is probable that both the fair results and temporarily good or fair results of only 2 years' duration can be considered of sufficient benefit to the patient to justify nephrectomy. Even a partial lowering of the blood pressure, or a temporary lowering of blood pressure for a period of 2 years, prevents part of the inevitable strain on the cardiovascular system produced by the hypertension, and thus delays the inevitable breakdown of the heart or large vessels.

The series of 61 cases can be broken down into three groups according to the nature of the disease in the kidney which was removed. In 29 cases there was marked renal atrophy and fibrosis (Table II). In each of these cases the kidney which was removed weighed less than 115 grams, and in 21 of the 29 cases the kidney weighed less than 70 grams. In most of the cases the lesion was considered to be chronic atrophic pyelonephritis. In a few it was probably congenital hypoplasia with secondary pyelonephritis. In 26 cases there was advanced hydronephrosis with evidence of previous or active infection, and with considerable destruction of the renal parenchyma by cicatrization (Table III). The function of these kidneys was markedly impaired. In the

TABLE V.—RESULTS 2 YEARS AFTER NEPHRECTOMY AMONG 61 HYPERTENSIVE PATIENTS, ACCORDING TO PREOPERATIVE LABILITY OF BLOOD PRESSURE

Blood pressure, status	Results	
	Good or fair	Poor or death
Relatively labile	18	11
Relatively fixed	17	15

6 other cases there was advanced tuberculosis with destruction of more than 50 per cent of the renal parenchyma, sometimes with almost complete destruction of the renal parenchyma (Table IV).

The results in the three groups of cases are given in Tables II, III, and IV. No definite difference in the results was noted in the three separate groups.

Of the entire 61 patients, 25 were male and 36 were female. There were almost four times as many female as male patients in the group with chronic atrophic pyelonephritis, and there were a few more males than females in the group with hydronephrosis. Of the entire group, 64 per cent of the males and 53.7 per cent of the females still had good or fair results after 2 years.

We have been impressed by the fact that both good and poor results have followed nephrectomy on patients who had very similar renal lesions. From the standpoint of the hypertensive disease itself, careful study of the data in this group of cases failed to yield information which would lead to a prediction as to which patients might be expected to present good and which poor results after removal of the badly diseased kidney. In this series of 61 cases the known duration of the hypertension, the known duration of the renal disease, the results of urinalysis, and the electrocardiographic observations failed to give information which would aid in the prediction of good or poor results after nephrectomy. Studies of the relative lability or fixation of the blood pressure, including the cold pressor test, studies of the blood pressure after the patient had rested in bed for a period of 24 hours and after he or she had received barbiturates, also failed to show differences which might aid in the prediction of results (Table V).

TABLE VI.—RESULTS OF NEPHRECTOMY AS SHOWN BY RETINAL EXAMINATION 2 YEARS AFTER OPERATION: 61 HYPERTENSIVE PATIENTS WHO UNDERWENT UNILATERAL NEPHRECTOMY

Keith-Wagener classification*	Results	
	Good or fair	Poor or death
Group I	6	4
Group II	20	9
Group III	5	8
Group IV	4	5

*See text for explanation of this classification.

The patients were divided into four groups on the basis of retinal examination, according to the Keith-Wagener classification, namely, group I—those who did not have sclerosis of the retinal arteries or retinitis; group II—those who had sclerosis of the retinal arteries but no retinitis; group III—those who had sclerosis of the retinal arteries and retinitis, but without edema of the optic discs; and group IV—those who had sclerosis of the retinal arteries, retinitis, and edema of the optic discs. Results which followed nephrectomy in these various groups are shown in Table VI. There were both good and poor results in all groups, but relatively more good results were obtained in group II. There was no significant variation in results obtained among individuals in various age groups, although results were slightly better for individuals less than 20 years of age and for those between the inclusive ages of 30 and 39 years.

It is obvious that since hypertension usually occurs in the absence of severe unilateral renal disease and that severe unilateral renal disease not infrequently is found in patients who do not have hypertension, the combination of the two conditions at times may be entirely coincidental, possibly in as many as 20 to 30 per cent of cases in which both conditions are found. Even if unilateral renal disease may have been the cause of the hypertension, it would seem that in a given case sooner or later irreversible vascular changes may take place diffusely in the body and in the good kidney, which would prevent relief of the hypertension, even if the original cause is removed. These two possibilities may explain the poor results which

followed nephrectomy in cases in which all observations seemed similar to those in other cases in which good results were obtained.

In review of the pathologic data, evidence of infection, either active or dormant, was noted in the tissues of all kidneys removed. In all cases of hydronephrosis, extensive pyelectasis also was present. It has been shown, both experimentally and on the basis of clinical records, that unilateral retention of urine with back pressure such as occurs with hydronephrosis, in itself would not be a cause of hypertension. It would seem, therefore, that the changes in the renal tissue as a result of infection probably are the important factors which favor the intrarenal secretion of pressor substances. So far, no one has been able to determine the exact histologic changes which cause secretion of pressor substances. Of the various hypotheses suggested as the cause of pressor secretion, intrarenal circulatory imbalance (Page and his co-workers) would seem to be most plausible. The microscopic appearance of the tissues in two atrophic pyelonephritic kidneys which have been removed for hypertension may be very similar, and the hypertension may persist in one case and it may disappear in the other. There are no specific clinical, urographic, or pathologic data which would give definite preoperative indication as to the possibility of eliminating hypertension if the kidney is removed.

SUMMARY

An analysis has been made of 61 cases of hypertension in which advanced unilateral renal disease was found and the affected kidney was removed as treatment for the hypertension.

Follow-up studies in this group of cases have shown that 2 years after nephrectomy results were good in 25 cases, or 41 per cent; fair in 10, or 16.4 per cent; poor in 20, or 33 per cent, and that 6 patients, or 10 per cent were dead.

The condition of 32 patients was followed for 5 years. At the end of this time good results were present in 10 cases, or 31 per cent; fair results in 5, or 15.6 per cent; poor results in 11, or 34.4 per cent, and 6 patients, or 19 per cent, were dead.

Both good and poor results were noted among patients in different age groups, in both sexes and among patients who had various degrees of severity of hypertensive disease.

Clinical analysis of these cases from the standpoint of the hypertension failed to reveal information which was of value in preoperative prediction of the effect of nephrectomy on the subsequent course of the hypertension.

No specific urologic or pathologic observations were noted in the affected kidneys which would indicate whether good or poor results would follow nephrectomy.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Cánepa, J. R. F., Corsellas, M. F., and González, J. M. L.: Eosinophile Granuloma of the Frontal Bone (Granuloma eosinófilo del frontal). *Sem. méd.*, B. Air., 1946, 53: 566.

A case of eosinophil granuloma of the right frontal bone is reported by the authors. The patient complained of an extremely intensive pain over the right eyebrow. On examination edema of the right frontal region and a tumefaction were found. The roentgenograms revealed an osteolytic process in the right frontal bone. The lesion, 2.5 cm. in diameter, had a round shape with a slightly irregular outline: there were no signs of any focal reaction. From the roentgenological point of view myeloma and tuberculosis of the bone were considered.

In view of a slight fever, sulfa drugs and penicillin had been given but diplopia appeared and the process showed a progression. Under local anesthesia a horizontal incision was made and a biopsy specimen was obtained.

Deep x-ray therapy caused disappearance of the symptoms. A roentgenogram taken 60 days after therapy was discontinued showed a marked reduction of the size of the lesion and an osteogenic reaction which gradually obliterated the cavity. The histological diagnosis was "eosinophil granuloma." The frontal bone is the most frequent site of such formations. Histological and bacteriological studies, as well as the failure of anti-infectious therapy, allowed the exclusion of pyogenic, tuberculous, or tumoral etiology of the condition in this case. The symptomatology, evolution of the lesion, and the histological findings suggested allergy as a possible etiologic factor. Eosinophil granuloma is a benign lesion, distinct from Hand-Schuller-Christian's disease. Deep x-ray therapy is the proper treatment of this condition. JOSEPH K. NARAT, M.D.

Robinson, M.: Temporomandibular Joint. *J. Am. Dent. Ass.*, 1946, 33: 1260.

The action of the jaw is a reflex nonlever action. The anatomic and histological structure of the temporomandibular joint shows that it is not meant to bear heavy stresses. The jaw is not a lever of the third class. The muscles of mastication are so placed that the resultant force of their actions can be borne by the teeth, the joints being left free from traumatizing stress. Heavy stress is developed in the denture only during isometric muscular contraction. The normal stresses in the mandible are regulated by a positional and a masticatory reflex activity in the fifth cranial nerve, in its motor and mesencephalic nuclei. The disc is not fibrocartilage but a specialized connective tissue which is capable of repair. NOAH D. FABRICANT, M.D.

Kivimäki, J.: Recurrent Dislocation of the Mandibular Joint. *Ann. chir. gyn. fenn.*, 1946, 35: 99.

Arthroses of the mandibular joint are characterized by pain, tenderness, and crackling sounds in opening and closing of the mouth. In advanced cases, they often result in repeated or habitual luxation or subluxation. Although the etiology of the arthroses is unknown, malocclusion and incorrect bite, caused by the loss of several molars or premolars, probably are predisposing factors. Injections of alcohol and iodine in the joint proved unsatisfactory.

The treatment of choice is surgery (ante-position of the articular disc). Recently, prosthetic therapy, in the form of reconstruction of the bite, has been suggested. It is, however, more expensive and takes more time than operative treatment. WERNER M. SOLMITZ, M.D.

EYE

Richards, J. M., and Romaine, H. H.: Keratoconjunctivitis Sicca after Stevens-Johnson's Disease. *Am. J. Ophth.*, 1946, 29: 1121.

In 1922 Stevens and Johnson reported a case of the purulent conjunctival form of erythema exudativum multiforme. Since then, others have reported this condition but have not mentioned keratoconjunctivitis sicca.

These authors report a case of exudative erythema multiforme which occurred in a woman following the use of belladonna and phenobarbital. The prodromal symptoms were typical of measles, but progressed to a state in which diffusely confluent erythematous, maculopapular eruption enveloped the face, the neck, the trunk, and the extremities, in association with scattered, large, confluent, thin walled bullae. The patient became dehydrated, prostrated, and hyperthermic. The period of general involvement lasted about 2 weeks. The mucous membranes were involved with a resultant edema, necrosis, and mucopurulent discharge. There was destruction of the corneal epithelium and conjunctiva with consequent adhesions. Later there was a progressive infiltration and opacification of both corneae. As the stage of inflammation changed to cicatrization, the typical signs of keratoconjunctivitis sicca appeared. There was corneal stippling and little lacrimation. Treatment was of no avail and corneal ulcers continued to reoccur. The vision in the left eye was markedly reduced, and the right eye was enucleated because of a perforated ulcer. ROGER H. JOHNSON, M.D.

Castroviejo, R.: Indications for Keratoplasty. *Am. J. Ophth.*, 1946, 29: 1081.

The surgical procedures used for the treatment of corneal opacities are keratoplasty and keratectomy, the former usually being preferred because of the better results. The temporary contraindications to this surgery are inflammation, burns in which the eye has not become quiet, and glaucoma which has not been treated by the appropriate surgery.

The author divides the cases of keratoplasties and keratectomies into three main groups on the basis of their prognosis. The first group is made up of the favorable cases in which the final vision averages better than 20/50. This group includes those cases with a central corneal opacity surrounded by healthy tissue, keratoconus, and interstitial keratitis when the opacity is not too dense and extensive and when the transplant will remain in contact with fairly healthy corneal tissue.

The second group is composed of those cases less favorable for keratoplasty but likely to result in a considerable improvement of vision. In this group are most of the corneal dystrophies, the complete superficial opacities of the cornea with healthy epithelium and no superficial vascularization, superficial tear-gas burns with no vascularization, adherent leucomas, descemetoceles, and interstitial keratitis with somewhat denser opacities.

The third group is unfavorable because the transplant is likely to become opaque. Included in this group are the extensive corneal scars which go to the limbus or which have superficial vascularization, extensive leucomas in which the transplant would be surrounded in more than half its circumference by dense scar tissue, band-shaped opacities, dystrophia adiposae, deep corneal burns due to tear gas, and corneal opacities in aphakic eyes.

Fuchs's epithelial dystrophy, extensive corneal opacities with calcareous degeneration, corneal opacities caused by pemphigus, and corneal opacities with extensive anterior synechiae are not improved by keratoplasty or keratectomies. The author also advises against operating on very unco-operative patients. ROGER H. JOHNSON, M.D.

EAR

Muzzio, J. C.: Peripheral Facial Paralysis in Acute Otitis Media (La parálisis facial periférica en la otitis media aguda). *Sem. méd.*, B. Air., 1946, 53: 342.

Peripheral facial paralysis is of particular interest to the otologist because of the intimate anatomic relation of the peripheral tract of the facial nerve to the ear, the diagnostic, prognostic, and therapeutic indications of the condition, and its physical consequences, social and economic, for the patient. The facial nerve emerges from the sulcus of the bulbar protuberance, the motor and sensory roots uniting into a common trunk, and joins the auditory nerve in its entrance at the internal auditory meatus, then it continues through the fallopian aqueduct down to the stylomastoid foramen, and after a short intraparotid course divides into two terminal branches, the temporofacial and the cervicofacial, which innervate the cutaneous facial except the superior elevator of the eyelid muscles and the neck of the corresponding side. The nervus intermedius of Wrisberg runs in the aqueduct and terminates at the geniculate ganglion and separates from the seventh nerve as a mixed nerve. Besides the terminal branches there are 10 collateral branches, 5 of which are intrapetrosal, passing through the walls of the aqueduct. The facial nerve in its course comes in contact with the auditory, trigeminal, and vagus nerves, and its superficial cervical plexus. Branches are also sent to the muscles of the stapes and palate, sensory fibers to the pinna, external auditory meatus, and tympanic membrane, gustatory nerves to the anterior two-thirds of the tongue, and secretory fibers to the sudoriparous glands of the face, and the salivary and lachrimal glands. Vasodilator fibers are also distributed. The stylomastoid artery and vein accompany the facial nerve in its intrapetrosal course, the artery giving branches to the tip of the mastoid and tympanic cavity, and it must be remembered that this neurovascular group completely fills the canal.

From the etiopathogenic and surgical viewpoints of intrapetrosal facial paralysis the nerve may be divided into three segments: the first or labyrinthine segment, the second or tympanic segment and the third or mastoid segment. The facial nerve is in direct anatomic relation with the temporal bone and its anomalies of pneumatization. The tympanic portion presents little resistance to aggression because the osseous lamina separating it from the middle ear is very thin and at times dehiscent. Embryologically, the aqueduct is membranous and the nerve is separated only by fibromucous membrane of the middle ear; later this groove is transformed into the osseous canal, but in the newborn it is open in part at the portion between the oval window and the horizontal semicircular canal and this dehiscence may persist throughout life. The tympanic portion presents a raised part, the eminence of the facial canal, which is inextensible and compresses the nerve during inflammations or periostitis. Small osseous cells near the geniculate ganglion may propagate infection in case of osteitis. The mastoid portion has a length of from 6 to 12 mm., a diameter of 4 mm. at the extreme superior end, and a diameter of 6 mm. at the stylomastoid foramen. Processes affecting its superior third produce pressure early. In pneumatic and pneumaticodiploic mastoid processes, the osseous cells can invade the walls of the aqueduct and separate its contents by thin laminae of bones, or excessive pneumatization near the internal jugular bulb may cause dehiscences. Occasionally, invasion is limited to the superior third of the mastoid portion; the cells encircle it in front, on the inside, and behind, and if there is mastoiditis, the facial nerve may be harmed. The aqueduct may present compact osseous walls in its entire course and the nerve is very rarely injured

at its exit at the stylomastoid foramen in case of apical mastoiditis. The facial nerve may transmit infection to the meninges in the same manner that the auditory nerve carries infection to the optic nerve. The middle ear and the mastoids, and the aqueduct and its contents are continuous structures, therefore the virulence and type of otic infection and the mucosal reaction are blamed for the paralysis due to compression and varying degrees of toxic neuritis during acute otitis media. Intact nervous trunks are very resistant to suppuration, even for months, without functional disturbance, but very susceptible to apparently light compressions.

In autopsies, revealing osseous caries and dehiscences, the nerve bathed in pus during life never presented symptoms of facial paralysis. The cause of compression of the facial nerve in acute otitis media is not clear: it may be due to vascular congestion, inflammatory exudates, or to edematous tumefaction in addition to an inextensible osseous wall. Adhesions of the nerve sheath to the periosteum of the aqueduct tend to localize the compression; narrowing of the duct results from periostitis and pressure by the contents of the tympanum on the fibromucosa in case of dehiscences. Paralysis is not due to direct nerve infection but to a modification of the neurovascular apparatus produced by inflammation, a toxic paralysis of the motor nerves of the vessels in the aqueduct followed by edema and degenerative lesions of the nerve. Osteitis of the facial canal is a very rare cause of paralysis, and, if it occurs, the nerve is deprived of its osseous covering and is exposed to inflammatory granulation tissue and infection, which is likely to lead to its ultimate destruction.

Kettel performed mastoidectomy only in 37 cases for peripheral facial paralysis and found no osteitis in 7 cases: Demelius found none in 2 of 7 cases, in the 2 others the osteitis was of low grade, and in 3 cases it was severe. Many mastoidectomies reveal great zones of osteitis but facial paralysis is not an absolute sign of mastoiditis. In the majority of cases it is of toxic origin. Paralysis appearing at the beginning of acute otitis media is caused by inflammation of the tympanic cavity, and after the second week may be caused by mastoiditis with empyema. Tuberculosis, scarlet fever, pneumococcus mucosus, measles, and influenzal otitis media are the important etiologic agents in peripheral facial paralysis. Early age is a factor and males are more susceptible than females. The incidence varies: Kopetzky found it in 3 per cent; Danelius in 1 per cent, Pollmann in 14 (0.7) of 1,823 cases, Kettel in 50 (0.5%) of 9,891 cases, and the author in 5 (0.59%), of 7,844 cases.

Symptoms of peripheral facial paralysis may appear any moment in acute otitis media, more commonly in the first and third weeks. It rarely is the first symptom, and if it appears before tympanic perforation, tuberculosis should be suspected. The otitis may be slight and insignificant, passing as a nervous complication of another cause. It appears early in the young as the fallopian aqueduct is very thin, at times dehiscent, and very vulnerable to early toxemia and osteitis. There are very slight or no prodromal symptoms, or the condition is preceded by auricular pains including half of the face with involuntary contraction of the facial muscles. The condition may also appear at the commencement of its complete symptomatology when there is a corresponding intrapetrosal lesion of the nerve.

Treatment is essentially directed to the otitis media. For paralysis with an intact tympanic membrane, early and ample paracentesis for efficient drainage and decompression is indicated; if there is a perforation mastoidectomy should be done. Conservative treatment of the otic infection is indicated if it follows a normal course and there are no definite signs of mastoid complication. Paralysis is a relative indication for mastoidectomy since it is not a sure sign of mastoiditis. Once mastoid complication is recognized, immediate mastoidectomy is enough to banish the greater part of the paralysis and no operation should be done on the fallopian aqueduct. A reasonable length of time for observation should be allowed and then if faradic treatment is negative, decompression of the nerve in the aqueduct should be considered. The prognosis is generally favorable.

A. B. VICENCIO, M.D.

NOSE AND SINUSES

Fomon, S., Syracuse, V. R., Bolotow, N., and Pullen, M.: Plastic Repair of the Deflected Nasal Septum. *Arch. Otolar.*, Chic., 1946, 44: 141.

The author challenges the contemporary orthodoxy which still adheres to the concept that maintenance of the profile projection of the nasal pyramid is dependent mainly on support furnished by the septum.

The author proves that the saddle nose created by a too generous removal of the nasal septum is not the result of removing the supports but is due to the development of internal stresses arising from cicatrization of the deskeletonized connective tissue.

The operation is described in great detail with many figures. The first steps are like those of the orthodox method of resection of the nasal septum, but the author excavates the columella and places a thin cartilage graft in the bed and holds it in place with two sutures placed behind the graft. The obstructing cartilage is removed with scissors or a swivel knife, as far ventrad or caudad as necessary. A quadrilateral piece of cartilage is placed beneath the perichondrial flaps and anchored by two mattress sutures.

The purpose of the cartilaginous replacement is not to furnish support, since the graft, having no abutment above or below can sustain no weight. Like the columellar "batten," it is replaced to prevent contraction of the connective tissue in the process of healing and thus the consequent distortion and saddling of the dorsum is eliminated.

JOHN F. DELPH, M.D.

Young, F.: The Repair of Nasal Losses. *Surgery*, 1946, 20: 670.

The object of any reconstructive surgical procedure is to restore or improve function, and, especially if the restored part is a facial feature, to approach the normal as closely as possible. This may be difficult with the nose which may have been partly destroyed by accident, disease, or by the treatment of any disease.

The surgeon should be thoroughly familiar with the form, structure, and function of the nose. A brief review is given of the structure and function of the nose, and its relation to the face. Some emphasis is placed on the importance of a good appearance of the nose as a poor one may be a great social and economic handicap.

In the reconstructive surgery of the nose, it is important to save as much normal tissue as possible as it is better than any that can be substituted. For grafting, the skin of the forehead is the best as the color and texture of that skin is similar to that of the nose. The use of skin to replace destroyed nasal mucosa has its disadvantages, but skin is the best substance available.

Young gives a brief description of his plastic repair of nasal losses which is usually done in several operations. A number of diagrams are included to show the stages in his procedures. Photographs are included of several cases showing the appearance before and after the reconstruction surgery.

WILLIAM A. AHROON, M.D.

Mohs, F. E.: Chemosurgical Treatment of Cancer of the Nose; A Microscopically Controlled Method. *Arch. Surg.*, 1946, 53: 327.

The chemosurgical treatment of cancer of the nose has the great advantage of thorough microscopic control of the excision. This control is responsible for the unprecedented reliability and conservatism of the method.

The reliability of the method is indicated by the unusually high proportion of successful results, declares the author. Thus, for basal cell carcinoma, successful results were obtained in 98 per cent of 202 cases observed for 6 months or more, in 97.2 per cent of 109 cases observed for a 3 year period, and in 94.3 per cent of 53 cases observed for a 5 year period.

For squamous cell carcinoma the rate of cure was 93.9 per cent for the 33 cases observed for a 6 month period, 87.5 per cent for the 16 cases observed for a 3 year period, and 81.8 per cent for the 11 cases observed for a 5 year period. These results were obtained despite the fact that many of the cancers were far advanced and more than one-third had recurred after previous irradiation or surgical treatment.

The method is conservative, since only 1 or 2 mm. of tissue are removed beyond the points of actual carcinomatous invasion. The method is also useful in the treatment of various benign neoplasms and of precancerous lesions of the nose.

NOAH D. FABRICANT, M.D.

MOUTH

Lee, F. C.: Orbicularis Oris Muscle in Double Harelip. *Arch. Surg.*, 1946, 53: 407.

During the operations on 3 patients with double harelip, a modification of one of the usual plastic procedures was evolved. The essential feature of this change was to join the sphincter muscles of each side across the premaxilla, and, to this end, it was necessary to cut deeply into the lip at right angles to its edge in order that a flap of sufficient length could be sewn to the corresponding structure of the opposite side. What was not known at the time was how much sphincter oris muscle was present. It is the purpose of this article to give the anatomy of this muscle in double hairlip.

In order to study the orbicularis oris muscle, serial sections were made of the left side of the upper lip of a 5 month human specimen having double harelip.

It was found that this muscle is well developed at the corner of the mouth but quickly becomes thin and fragmented as the ala of the nose is reached. It is moderately effective in forming a barrier to keep the buccal glands in a posterior position in the lip.

No support was found for the view that there is a large concentration of purely sphincter muscle fibers at the corner of the mouth. JOHN F. DELPH, M.D.

Dorrance, G. M., and Bransfield, J. W.: The Push-Back Operation for Repair of Cleft Palate. *Plast. Reconstr. Surg.*, 1946, 1: 145.

The "push-back" operation, first devised for congenital insufficiency of the palate, has been employed by the authors in the treatment of all varieties of cleft palate for a period of 20 years. During this time many minor changes have been made, but the main idea behind the procedure has remained unchanged. The authors have seen some of the cases in which the method was employed, with or without modifications, by at least 20 different surgeons, and they believe they are now in a position to evaluate the final results which have been obtained.

Despite the fact that the authors have never known of the loss of a flap in cases in which their method was followed, they are constantly receiving inquiries as to whether or not the posterior palatine arteries should be divided. Many surgeons insist on saving the vessels. Many surgeons who use the principle of the push-back do not advise the use of skin grafts to line the under surface of their flaps.

The purpose of this article is to give the indications for the push back operation, as well as the operative details, and to attempt to show the necessity for following out the various steps which are recommended. NOAH D. FABRICANT, M.D.

Adams, W. M.: The Use of the Masseter, Temporalis, and Frontalis Muscles in the Correction of Facial Paralysis. *Plast. Reconstr. Surg.*, 1946, 1: 216.

Numerous techniques utilizing muscle transplantation in the correction of facial paralysis have been

reported, with varying results. Many of these have been far from satisfactory. Since nerve grafting is impossible in so many of these cases at the present time, the author believes that some form of muscle substitution is the only treatment which will give these patients not only support but the maximum amount of motion in the paralyzed side of the face.

In the reconstructive centers of both the Army and the Navy, a large number of satisfactory and encouraging results have been obtained, and these have given an increased impetus to utilize muscle substitution in facial paralysis. The transplantation of flexor muscle tendons, to do the work of the extensors, has, in many cases, elicited results which appear to be startling.

Two cases are reported, which give further evidence of the effectiveness obtained by the use of muscle flaps in the correction of facial paralysis. At best, the procedure is a compromise. However, muscle transplantation gives not only the same support accomplished by fascia strips but, in addition, affords voluntary motion without the distorting movements associated with nerve substitution.

NOAH D. FABRICANT, M.D.

Newman, S. C., and Seabrook, D. B.: Management of Injuries to Stensen's Duct. *Ann. Surg.*, 1946, 124: 544.

In the past, surgery for the repair of lacerations or injuries of Stenson's duct has been unsuccessful. There have been occasional cases in which good results have been obtained in the immediate repair of injuries of this type, but reports of success in the treatment of the more chronic types of fistula have been few.

Fig. 1 (Newman and Seabrook). The intraoral and external probes are in position. The mass of scar tissue and the cicatrized portion of the distal segment have been excised. The metal dilators, drawn to scale, are shown in the lower right hand corner. (Courtesy of J. B. Lippincott Co.)

The authors encountered a number of cases of injury to Stenson's duct while on duty at an Army general hospital during the years of 1943, 1944, and 1945, and as a result of their experience they have developed a general plan for the operation and care of patients with injuries of this type. No claim to originality is made, since the operation has been described in principle by others. A detailed description of the procedure is given.

NOAH D. FABRICANT, M.D.

NECK

Grelland, R.: Thyrotoxicosis at Ullevål Hospital in the Years 1934-1944, with a Special View to Frequency of the Disease. *Acta med. scand.*, 1946, 125: 108.

There was a gradual increase in the number of cases of thyrotoxicosis observed at the Ullevål Hospital from 1934 to 1942, with peaks in 1939 and 1941. In 1944 there was a sudden decrease in the number of cases, back to the 1937 level. During the years from 1940 to 1944 there was an increase in the number of elderly patients and of men. The average duration of the disease for the 10 year period, was 10½ months; an enlarged thyroid gland was found in 88 per cent, exophthalmos in 40 per cent, tremor in 72 per cent, and auricular fibrillation or flutter in 26 per cent. There were 222 women and 31 men in the study, a proportion approximate to that of a much larger study from several Scandinavian hospitals. The increases in the total cases during 1939 and 1942 and in the proportion of men were attributed to the tensions produced by the war.

In this series, the systolic blood pressure was from 25 to 30 mm. above normal, with no change in diastolic pressure. The mean pulse pressure was 71 mm. Hg. The heart beat was powerful and rapid, with clear tones in 43 per cent, systolic murmur in 57 per cent, and of these 57 per cent, 4 per cent also exhibited a diastolic precordial murmur. Twenty-six per cent of 204 cases examined electrocardiographically exhibited continuous or paroxysmal fibrillation or flutter, 10 per cent exhibited "myopathy," 26 per cent tachycardia, and 38 per cent a normal electrocardiagram. Auricular fibrillation in a majority of cases was associated with a previous history of acute rheumatic fever. The percentage of cases of toxic adenoma with auricular fibrillation was 31, whereas among the hyperplastic goiters there were only 17 per cent with auricular fibrillation. Thirty-five per cent of all cases presented had enlarged hearts.

Although 30 per cent of the cases exhibited glycosuria, there was associated diabetes mellitus in only 2.8 per cent of the cases.

Blood cholesterol ranged from 68 to 226 mgm. per 100 c.c. (average 134 mgm.).

Of 200 patients subjected to surgery, only 1 died (0.5 per cent). The author states that "the low mortality . . . is attributable to . . . the careful selection of patients and elaborate preoperative control and treatment . . . "

There was little evidence that heredity, infection, administration of iodine, or the use of thyroid preparations were factors in the production of thyrotoxicosis. It was thought that the decrease in incidence of the disease during the last year of the period (1944) was due in part to undernutrition of the patients.

Psychic factors were considered important in the causation of symptoms.

CLINTON H. THIENES, M.D

Sikkema, S. H., Thewlis, E. W., and Meyer, O. O.: Sternal Marrow Studies in Thyrotoxicosis Treated with Thiouracil and a Review of the Literature Regarding Thiouracil Effects on the Blood. *Blood. J. Hemat.*, 1946, 1: 411.

The danger of the occurrence of leucopenia and agranulocytosis during thiouracil therapy has been repeatedly emphasized.

The authors present serial studies of the peripheral blood and sternal marrow in thyrotoxic patients before and after treatment with thiouracil and after thyroidectomy. They also review a total of 1,914 cases of thyrotoxicosis reported in the literature and discuss the effect of thiouracil on the blood and marrow in these cases.

Dameshek has stated that in agranulocytosis the bone marrow shows an immediate reaction with reduced numbers of granulocyte precursors, and shortly thereafter a loss of mature, and then immature, granulocytes takes place. If the patient survives, the granulocyte precursors reappear, and this is the stage which has frequently, perhaps erroneously, been termed "maturation arrest"; the mature granulocytes then reappear.

The dosage-time factor and the time factor, as well as hypersensitivity, have been considered as causes of leucopenia and agranulocytosis by other authors.

The authors present a study made on 27 cases of definite thyrotoxicosis at the Wisconsin General Hospital at Madison. Studies were made of the peripheral blood and sternal marrow before treatment, after the administration of iodine, after iodine therapy and thyroidectomy, after thiouracil therapy, and after thiouracil therapy and thyroidectomy.

Two patients presented complications; one, in the form of leucopenia, and the other in the form of agranulocytosis. The latter patient recovered from the agranulocytosis, but developed a thyroid crisis and died.

No significant changes were found to occur regularly in the blood or marrow of patients receiving thiouracil. In certain unpredictable cases, leucopenia or agranulocytosis occurs. In both cases reported, the reaction followed a period of borderline leucopenia. Not all patients with such counts progress to a serious reaction but all patients receiving thiouracil should have leucocyte and differential counts 3 times a week and daily counts when the count drops to a borderline level (about 5,000).

Analysis of the blood and marrow findings in the 2 cases with a severe reaction shows they are consistent with the series of events described by Dameshek. The patient with agranulocytosis had a normal count before thiouracil therapy. She had 1,600 leucocytes with 16 per cent neutrophils the day preceding symptoms and on the first day of the symptoms the marrow showed a complete absence of young and adult neutrophils (as was the case in the peripheral blood). In the first few days of beginning recovery, the peripheral blood showed more young than adult neutrophils. Terminally she had 16,000 leucocytes with 78 per cent total neutrophils, and final marrow examination (14 days after the previous one) revealed a reduction of the percentage of blasts to the normal range, but the increase then was chiefly in the myelocytes and metamyelocytes with only a slight return of the adult neutrophils by that date.

In the case with neutropenia, the original blood and marrow observations were within normal range. The second marrow study was done 3 days before fever began—the first clinical indication. The marrow showed definite reduction in myelocytes and the metamyelocytes were few. By the time of the third sternal puncture, the patient had recovered clinically and the values were back to normal. In both cases the sequence of events is more readily correlated with the concepts of Dameshek than with the relatively prevalent idea of "maturation arrest" at the myelocyte stage.

The cases presented do not add much to the understanding of the mechanism of development of agranulocytosis. In the case with agranulocytosis the possible importance of the dosage-time factor has to be considered as the patient had had thiouracil for 118 days in four courses over a period of 7 months. In the case with neutropenia, sensitivity could be considered as there was an increase in eosinophils and the drug had been given for only a short time. It may be that all cases do not develop by the same mechanism.

The series is too small for definite conclusions, but in some respects tends to confirm the previous observations of others, such as the following: thiouracil affects chiefly the neutrophils and particularly the younger ones, and agranulocytosis begins with alarming suddenness.

The authors believe that serial sternal marrow and blood studies fail to show any regularly occurring changes after thiouracil therapy. Changes are seen only in the few relatively unpredictable cases in which leucopenia and agranulocytosis develop. The studies support the views of Dameshek on the course of events rather than the concept of "maturation arrest" at the myelocyte stage.

Patients receiving thiouracil should have frequent leucocyte and differential counts.

EDMUND R. DONOGHUE, M.D.

Cattell, R. B.: A More Optimistic Approach to Cancer of the Thyroid. *West. J. Surg.*, 1946, 54: 444.

This is the report of the experiences at the Lahey Clinic with thyroid cancer, the results of which, the author believes, warrant a more optimistic view of the disease. Previous to January, 1946, 487 patients with cancer of the thyroid were treated surgically or by combined surgical and radiation therapy.

The author stresses the fact that the removal of discrete adenomas of the thyroid is of great importance in the prevention of thyroid malignancy. Twenty-six patients were found to have carcinoma in a gland removed for hyperthyroidism.

All tumors of the lateral aberrant thyroid must be considered as potentially malignant and may show definite cancer. Microscopically these tumors usually show papillary cystadenoma or papillary adenocarcinoma. The author strongly advises radical neck dissection in these cases, including removal of the homologous thyroid lobe. Radiation therapy is given subsequently. Of 47 such patients, 1 died of recurrent malignancy 22 months after a radical operation and radiation therapy; 5 patients are now living with pulmonary metastases.

In extensive thyroid cancer, as much of the gross malignancy as possible is removed, tracheotomy is performed, and the tube is kept in place until after the completion of the postoperative radiation therapy. Radical neck dissection is not indicated in these extensive cases. The 5 year survival rate of 231 cases of carcinoma of the thyroid is given; it varied from 80 per cent in the cases of papillary adenocarcinoma, to 17 per cent in the cases with giant cell carcinoma.

F. J. LESEMANN, JR., M.D

LeJeune, F. E.: Intralaryngeal Operation for Cancer of the Vocal Cord. *Ann. Otol. Rhinol.*, 1946, 55: 531.

It has been the author's experience that in certain cases of carcinoma of the larynx, operation by intralaryngeal dissection can be performed with results which are equally as good as those obtained by laryngofissure, if not better, provided certain fundamental requirements are rigidly observed. He has operated on 39 patients with early carcinoma of the vocal cord by the intralaryngeal route, and the base of the lesion was treated by electrocoagulation following the operation.

Nineteen of the patients have survived the 5 year period; 15 patients are alive and well from 1 to 5 years; and 3 patients have had recurrences.

The advantages of intralaryngeal extirpation are believed to be (1) simplification of the operation, (2) no external incision, (3) preservation of continuity of the thyroid cartilage, (4) better postoperative phonation, (5) shorter hospitalization, and (6) good prognosis.

EMIL C. ROBITSHEK, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Groff, R. A.: The Management of War Wounds of the Cranial Cavity. *Am. J. Surg.*, 1946, 72: 434.

Differences in climate appear to have little bearing on the methods of treating battle wounds of the head. This report originated in the China-Burma-India theater and coincides in principle with reports of similar cases in the other theaters of war. This is a general over-all survey of opinion in the theater; neither the specific cases nor the numbers of the cases forming the basis of the opinions are mentioned.

Certain interesting points of treatment are brought out, as, for instance, the use of the head-down position during the early transport stages and during shock was found beneficial. Not only was shock recovered from more quickly but the position facilitated the drainage of secretions and vomitus from the trachea and bronchi. Dehydration in the tropics must be carried out, if at all, with caution. The cases described by the author were, on the contrary, given from 500 to 1,000 c.c. of normal salt solution, with or without 5 per cent glucose solution. This did not materially increase the intracranial pressure and was considered beneficial to the general welfare of the patient. Air evacuation was found satisfactory and only 1 patient required oxygen; shock did not appear to be more conspicuous.

Several technical points were brought out:

1. The necessity for water tight closure of the scalp and the necessity for roentgenograms of the skull; complete débridement with the removal of metallic objects larger than 1 cm. in diameter is a necessity. Small inaccessible metallic fragments may be left.

2. When operation is done under local anesthesia too much time need not be consumed in waiting for all signs of shock to pass off; the condition of the patients continues to improve, with suitable therapy, during operation.

3. The interval between wounding and operation should not be prolonged, although the results are often better after than before 12 hours have elapsed. Wounds as old as 5 days can be closed. Dusting with sulfa powders was given up as being of no value. The dural closure controversy was here decided in favor of the American plan, i.e., closure with or without the use of transplanted tissue. There is a general résumé of the surgical technique which seems to be in accordance with the generally accepted practice of those doing the best work. ADRIEN VER BRUGGHEN, M.D.

Muntoni, E.: Experimental Study of Subdural Hematoma (Studio sperimentale dell'ematoma sottodurale). Sperimentale, 1942, 96: 8.

The study of subdural hematoma has become more important as the possibility of successful surgical treatment has increased. The author made an experimental study by opening the skulls of dogs and creating subdural cavities which after from 5 to 16 days were filled with blood. Photographs of the operation and the resultant cavities are given.

A detailed comparative histological study was then made of the membrane which always forms in human subdural hemorrhage and the artificially created membrane in these cavities. Photomicrographs of the findings are given. The subdural reactions were substantially the same in the two conditions, but clinically the artificially created lesions underwent a slow regression while in the clinical hematomas there was a progressive increase in size with a free interval between the occurrence of the accident and the development of the clinical symptoms. This may have been due to the fact that the clinical hematomas were not produced entirely by the trauma as there may have been secondary factors such as changes in the blood and in the brain tissue; there may also have been localized inflammations which favor the occurrence of hemorrhage. Such constitutional factors cannot be reproduced in experimental work.

It is believed that the only histologically demonstrable difference between subdural hematoma and pachymeningitis is that in the former there is communication between the vascular lacunae and the newly-formed vessels which can never be demonstrated in the latter. The author's histological findings seem to show that the vascular lacunae are only newly-formed vessels cut in different directions in different sections. AUDREY G. MORGAN, M.D.

Hule, V.: Primary Melanocytoblastoma of the Central Nervous System (Primární melanocytoblastomy v ústřední soustavě nervově). *Lékarské listy*, 1946, 1: 255.

A 40 year old woman without evidence of hereditary or acquired taint developed the picture of a space-usurping growth of the cerebellopontine region on the right side. The condition finally caused a spastic paralysis of both sides, but particularly of the left arm and leg, with inability to walk, difficulty in speech, and a clouded and finally stuporous mentality.

At autopsy a large pigmented (black) tumor of the right pontine region, involving the right pediculum cerebri, the lateral ganglia, and the floor of the fourth ventricle was found. The aquaeductus sylvii was deviated to the left and there was a huge internal hydrocephalus of all the ventricles. The tumor itself was made up of elongated cells arranged in whorls, which suggested a meningioma. Cells and intercellular spaces were filled with dark pigment. There was no sharp delimitation from the nervous tissues. Nests of tumor cells were found to be discrete and at a distance from the main mass of the tumor. The

tumor mass itself displayed numerous clear areas which had become markedly dilated by the fixing process and now exhibited the structure of a honeycomb type of tumor.

This type of tumor is rare, and the author believes that it arises from the leptomeninges which are of neuroectodermal origin, and that the tumor cells correspond in origin to the Schwann cells of the peripheral nervous system. The tumor is probably of embryonic origin, tends to appear in early childhood, and may be related to malformations of the central nervous system. It does not form metastases.

JOHN W. BRENNAN, M.D.

SPINAL CORD AND ITS COVERINGS

Ingebrigtsen, R.: On Dislocation and Fracture-Dislocation of the Spinal Column. *Acta. chir. scand.*, 1946, 94: 455.

The author reports 5 cases of fracture dislocation of the cervical spine. Four of the patients had spinal cord symptoms in the form of paraplegias and hemiparesis; the fifth patient had no neurological symptoms. The fifth and sixth cervical vertebrae were involved in 4 cases, and the sixth and seventh in 1 case. Open reduction of the fracture dislocation was performed immediately after admission of 3 of the patients in the Surgical Department of the Oslo University Clinic, and was followed by respiratory death. The fourth patient was operated upon 55 days after the injury; he had been treated with direct skeletal traction for 2 weeks prior to the open reduction. His functional recovery was excellent.

The author also reports on a case of fracture dislocation of the eleventh and twelfth thoracic vertebrae, with signs of a cauda equina lesion. The dislocationwas reduced immediately and the patient made a satisfactory partial recovery, enabling him to return to his former occupation.

Even though 3 of the 5 patients with spinal cord lesions died following early operation, the author recommends open reduction for all dislocations of the spinal column, without laminectomy, and as soon as possible after the injury. He also states that this procedure, when done early, will prevent the occurrence of post-traumatic vascular disturbances of the spinal cord and avoid changes in the passage of the cerebrospinal fluid. However, he does not report the presence or absence of a spinal subarachnoid block or other changes in the cerebrospinal fluid.

GEORGE PERRET, M.D.

Hyndman, O. R.: Pathological Intervertebral Disc and Its Consequences. A Contribution to the Cause and Treatment of Chronic Pain Low in the Back and to the Subject of Herniating Intervertebral Disc. *Arch. Surg.*, 1946, 53: 247.

To fully understand the pathological changes in intervertebral discs in relationship to the clinical picture, it is necessary to have a specific terminology. The author uses the term degenerating discs to imply that the pathological changes within the disc are continuous but at this stage have not compressed the nerve root. In a herniating disc there is a definite bulge of the annulus. However herniation is usually the result of advanced stages of degeneration. Thus, it is possible to visualize 2 separate clinical syndromes—one of low back pain and the other of sciatica. That these may overlap is easily understandable.

The symptomatology in the degenerating disc is that of chronic low back pain and reflex pain down the posterior aspect of the thigh. However, this seldom extends below the knee and is not purely segmental in distribution. This usually occurs periodically—especially the day following strenuous work. Some relief is obtained by sleeping on a firm mattress. There is no evidence of nerve root damage, such as paresthesias, anesthesias, or reflex changes, and the pain is not aggravated by coughing or sneezing.

In the herniating disc, chronic low back pain had preceded the sciatic radicular pain in about 75 per cent of the patients. The radiating pain extends in the sciatic distribution. The pain likewise occurs periodically, but when present is associated with more severe spasms of the erector spinal muscles and splinting of the spine. Coughing and sneezing usually result in exacerbation of the pain. Evidence of nerve root damage is almost invariably present.

In differentiating the reflex and radicular pain, the author has used Steindler's method of injecting the points of maximum tenderness with procaine hydrochloride. The relief of pain suggests that it is reflex in origin and hence a diagnosis of myofascial syndrome is made. Another point is that in patients with degenerating disc the pain is partially relieved by getting up and about, whereas in the herniated disc the pain is aggravated by further movements or continued activity.

There are 10 significant features often present in the neurological examination. These are as follows—(1) absence of the lordotic curvature of the lumbar spine, (2) physiological scoliosis, (3) spasm of the erector spinae muscles, (4) painful limitation of the back movements, (5) pain on straight leg raising and the equivalent of Kernig's test, (6) slight atrophy of the calf muscle in long-standing cases, (7) sensory changes compatible with nerve root damage, (8) tenderness to palpation and percussion over the affected region of the spine, (9) tenderness along the course of the sciatic nerve, (10) alteration of the patellar and Achilles reflexes. However, reflex and sensory changes in the presence of a history previously described make a diagnosis of a herniating disc mandatory, and it has not proved of sufficient value to differentiate between discs at the fourth or fifth interspaces. A number of rare symptoms are presented, such as pains in the neck, phantom limb, foot, and rectum.

Although roentgenograms are not diagnostic, there are several corroborative factors. A collapse of an interspace may be found in normal individuals and hence reliance cannot be placed on this finding

alone. A posterior lipping is believed to be of greater importance, particularly in long-standing cases. It is well to keep in mind that x-ray evidence of arthritis does not rule out a herniated disc.

The author is convincing in his reasoning that trauma is usually a secondary or aggravating factor. The annulus must be weakened by the degenerative process before trauma may produce herniation. This does not negate the possibility that trauma may be a causative factor in initiating the degenerative process; however, in such cases, the history should to some extent help decide the issue.

The operative procedure consists of separating the paravertebral muscles subperiosteally from the spinous processes and laminae. After roungeuring away the lower third of the fourth and fifth arches bilaterally, the ligamentum flavum is removed as completely as possible. In the degenerative disc, the interspace is thoroughly curretted. Only in a completely sequestrated nucleus may the remainder of the disc be left intact. Exploration is always done bilaterally and at both the fourth and fifth interspaces. Spinal fusion is not performed for the herniated disc. Bed rest for at least 2 weeks is considered advisable.

Stress is placed upon the frequency of herniating discs in the intervertebral canal. These may easily be overlooked if an extensive search or exploration is not carried out when the disc is not found in the more common sites.

Results are difficult to evaluate, although improvement is usually obtained in all cases when appraised at the end of 6 months. In sequestrated discs the sciatica is relieved in practically 100 per cent of the cases. The degenerated disc is a more serious problem and is often associated with back pain for several months after surgery. However, in this group the sciatic pain is usually relieved immediately. In most industrial cases the disability is reduced from an almost total to a 5 to 10 per cent disability.

JACK I. WOOLF, M.D.

PERIPHERAL NERVES

Cannon, B. W., and Love, J. G.: Tardy Median Palsy; Median Neuritis; Median Thenar Neuritis Amenable to Surgery. *Surgery*, 1946, 20: 210.

In 9 of the 38 cases in which the syndrome of a tardy median palsy with or without neuritic pain was encountered at the Mayo Clinic, operations were performed for the condition. At operation, the transverse carpal ligament was divided and neurolysis was performed on the compressed median nerve. The results in these surgical cases have been satisfactory.

Zachary, R. B.: Tendon Transplantation for Radial Paralysis. *Brit. J. Surg.*, 1946, 33: 358.

The author reviews and summarizes the results obtained following tendon transplantation for radial paralysis in 53 patients admitted to the Wingfield-Morris Hospital during the period from 1940 to 1945.

Two groups of cases are presented for comparison. In the first group (24 cases), both the flexor carpi radialis and flexor carpi ulnaris were transplanted into the extensors of the digits. In the second group (29 cases), the flexor carpi ulnaris alone was transplanted to the extensors; the flexor carpi radialis was left *in situ* for stabilization of the wrist.

Although the operations were performed by different surgeons, the techniques were standard. The transplanted tendons were threaded through the paralyzed tendons and sutured with black silk. The wrist was held in extension during the operation and until a plaster cast had been applied. After a period of 3 weeks the cast was removed, and an anterior plaster splint applied. For the next 3 weeks this splint was worn at night, and for a variable period during the day. Throughout this period, the transplanted muscles were given faradic stimulation and voluntary exercise.

In 5 cases (group I) in which both flexors had been transplanted, the palmaris longus was absent, and the results were poor. Not one patient could actively flex the wrist to neutral position, or extend the thumb or fingers completely. However, when the wrist was maintained passively in a neutral position, full active extension of the fingers was possible. It was evident, therefore, that a functionally good wrist would have resulted if it could have been maintained in a stable position.

In cases in which both flexors were transplanted, but the palmaris longus was present, results were better but, in many cases, still not completely satisfactory. An average of 50 per cent of function was obtained in the entire group of 24 cases.

In the second group of 29 cases, in which only the flexor carpi ulnaris was transplanted, and the flexor carpi radialis was left *in situ* for stabilization, the results were much better. Twenty-seven of the patients could extend the fingers to neutral position, 18 could extend the thumb completely, and all could flex the thumb strongly to the neutral position. The average functional result was 91 per cent.

It is concluded, therefore, that in tendon transplantation for radial paralysis, it is important to preserve an active wrist flexor to stabilize the wrist.

ROBERT E. GREEN, M.D.

Barnes, R., Bacsich, P., Wyburn, G. M., and Kerr, A. S.: A Study of the Fate of Nerve Homografts in Man. *Brit. J. Surg.*, 1946, 34: 34.

The present article was written with the idea of discouraging the use of nerve homografts for the repair of large nerves of the extremities in man, and to show the condition of homografts which have proved to be unsuccessful.

The authors have placed 8 large homografts measuring from 7 cm. to 25 cm. in length. In no case were they satisfied with the results. Seven of the 8 grafts were removed after varying lengths of time—from 140 to 904 days after grafting.

The nerve grafts were re-innervated for lengths varying from 10 to 25 mm. The authors do not be-

lieve there is any relationship to vascularity, but accept the suggestion of Seddon and Holmes that neurotization occurs only during the latent period before the host acquires an active immunity to the homograft. They believe that success might be greater if the nerve fibers reached the peripheral stump while the graft was still in a condition to act as a scaffold. They observed a fascicular necrosis which was later followed by a fascicular fibrosis. It was difficult to distinguish the older grafts from the surrounding tissue, which suggested that ultimately there is a total replacement of graft by the tissues of the host.

DANIEL RUGE, M.D.

Wertheimer, P.: Repair of Traumatic Loss of Substance of the Nerve Trunks of the Limbs. A Physiopathological Study (Réparation des pertes de substance traumatiques des troncs nerveux des membres. Étude physiopathologique). *J. chir.*, Par., 1946, 62: 288.

This is a very brief report on the abundant literature of the last few years on the repair of traumatic nerve losses. The important work of American and English authors during the war has especially increased our knowledge of the problems involved.

The author mentions the recent research concerning the structure of nerve protoplasm, the endoneural circulation of tissue fluid, the phenomena of diffusion and osmosis observed in the nerve trunks, and the work on the arterial supply of nerves which is of special importance for the repair of injured nerves. The fact that nerves show great resistance to ischemia is explained by the presence of a longitudinal intraneural network of anastomoses.

Much work has been done on degeneration and regeneration of the nerves. After severance, two processes start: destruction and disappearance of the myelin at the distal stump and proliferation of the Schwann cells. This proliferation reaches its maximum on the twentieth day, then decreases gradually. Regeneration can occur only if the axis cylinders of the proximal end are permitted to come in contact with and penetrate into the Schwann tubes of the distal end. This is dependent on the physical, chemical, and circulatory factors.

WERNER M. SOLMITZ, M.D.

SYMPATHETIC NERVES

Weddell, G., Macbeth, R. G., Sharp, H. S., and Calvert, C. A.: The Surgical Treatment of Severe Epistaxis in Relation to the Ethmoidal Arteries. *Brit. J. Surg.*, 1946, 33: 387.

Occasionally, epistaxis is so severe that it fails to respond to local measures such as packing and coagulation, and surgical intervention is resorted to.

The blood supply of the nasal cavities is derived from two chief sources: the sphenopalatine and facial arteries, which arise from the external carotids, and the anterior and posterior ethmoidal arteries which are branches of the ophthalmic artery which, in turn, springs from the internal carotid.

The sphenopalatine and facial arteries enter the nasal cavities through their lateral walls while the ethmoidals enter through the roof. The former are more accessible to local treatment through the nares than are the latter. However, many cases of epistaxis are due to injury or disease in which there is distortion of the nasal cavities, which makes them even less amenable to local therapy.

In the past, uncontrolled epistaxis has usually been treated first by ligation of the external carotid artery in the neck, and then by ligation of the internal carotid, if the former failed. Ligation of the external carotid is designed to stop bleeding from the sphenopalatine artery, while ligation of the internal carotid is designed to check hemorrhage from the ethmoidals.

The authors believe that while the former procedure is often justified, the latter is justified only when there is rupture of an intracranial aneurysm into an accessory air sinus. In other cases, in which it is desired to simply control bleeding from the ethmoidals, ligation of the internal carotid usually does little good because of the large collateral circulation from the opposite side through the circle of Willis. Also, the procedure is rather dangerous because of the possibility of producing cerebral ischemia.

The procedure recommended by the authors is as follows: the approximate site of the hemorrhage is determined; if it is from the lateral wall of the nasal cavity, the external carotid artery in the neck is ligated. If, however, it arises from the roof of the nasal cavity, the authors suggest ligation or coagulation of the ethmoidal arteries in the orbit.

The operative technique is described. It is considered a fairly simple and safe procedure.

Seven cases of epistaxis are reported, in which the hemorrhage was not controlled until the ethmoidal arteries on the affected side had been occluded. In two of these, the common carotid had been ligated in the neck without relief of the hemorrhage.

ROBERT E. GREEN, M.D.

Fontaine, R., Forster, E., and Stefanini, C.: Late Results of 63 Splanchnicectomies Done for Various Diseases, Except Chronic Arterial Hypertension (Résultats éloignés de 63 splanchnicectomies pour diverses affections en dehors de l'hypertension artérielle chronique permanente). *Lyon chir.*, 1946, 41: 279.

The authors, trained by R. Leriche, report the results of 63 splanchnicectomies done on 47 patients during the years from 1940 to 1945. By splanchnicectomy they usually mean a section of the greater splanchnic nerve with resection of the external horn of the celiac ganglion and of the first 2 or 3 lumbar sympathetic ganglia. The lesser and least splanchnic nerves were also cut whenever they could be identified.

This procedure was done bilaterally on 9 patients and unilaterally on 5 patients suffering from thromboangiitis obliterans (arteritis obliterans). Remission of all symptoms was observed in 5 cases; 7 other cases were much improved by the procedure, while

in 2 the improvement was only temporary. The cause of this disease is still unknown and the authors are aware that their treatment is not etiological. Although they believe that thromboangiitis obliterans may be due to endocrine disturbances especially of the adrenal glands, they find that they get better results with splanchnicectomies than with the removal of the adrenal glands. The section of the splanchnic nerves denervates the adrenals while the lumbar sympathectomy improves locally the collateral circulation in the involved extremity.

Their results are not as good in Raynaud's disease. They report on 3 cases, 2 of which showed improvement following bilateral splanchnicectomy, upper lumbar sympathectomy, removal of the left adrenal gland, and extirpation of both stellate ganglia. Realizing that Raynaud's disease cannot be cured with certainty by an intervention on the sympathetic chain or its postganglionic fibers, the authors come to the conclusion that this disease must be associated with the autonomic function of the arterioles and the capillaries. They believe that the surgical procedures are done too far away from the seat of the abnormal vasoconstrictive phenomena.

They have found that by doing a bilateral splanchnic block they were able to benefit greatly those patients suffering from dysphagia due to megaesophagus. Therefore, they performed a unilateral splanchnicectomy in 1 of 2 patients suffering from megaesophagus, and a bilateral thoracic splanchnicectomy with removal of the tenth and eleventh dorsal sympathetic ganglia in the other. Their results were not good and the patients had to have a cardiotomy. Because of the beneficial effect of amyl nitrite inhalations and of repeated local infiltrations of the splanchnic region, the authors conclude that, to be effective in cases of megaesophagus, the intervention should be done on the most peripheral nerve fibers, and they advocate a periesophageal sympathectomy.

Their results were much better in 11 women patients with megacolon. In these cases they did a unilateral or bilateral resection of the splanchnic nerve and of the first and second lumbar sympathetic ganglia. They report excellent results in 6 cases, great improvement in 2 cases, and poor results in 3 cases.

The authors also report 12 cases of painful hydronephroses treated by unilateral splanchnicectomy with resection of the upper 2 lumbar sympathetic ganglia, or by splanchnicectomy associated with the removal of the aorticorenal ganglion. Both types of procedure give identical results; their effect on pain is usually immediate and lasting, but their action on the dilatation of the pelvis of the kidneys and the ureters is less certain and not constant. The results were good in 9 cases, fair in 2, and poor in 1 case.

The authors also report on 2 cases of habitual vomiting without organic cause in which a left splanchnicectomy and upper lumbar sympathectomy were done with good results in 1 case. A bilateral splanchnicectomy was also done as a last resort in 1 case of chronic pancreatitis and resulted in the disappearance of the pain. Two patients with visceral tabetic crises were also treated by thoracic splanchnicectomies and resection of the tenth and eleventh dorsal sympathetic ganglia; the pain was relieved in 1 of them.

The authors have not included in this series the results of similar operations done on 28 other patients for similar afflictions within the last year. Their operative mortality was 1 per cent.

GEORGE PERRET, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Webster, J. P.: Mastectomy for Gynecomastia through a Semicircular Intra-Areolar Incision. *Ann. Surg.*, 1946, 124: 557.

Gynecomastia, or abnormal enlargement of the male breast, is a condition in which the appearance of the breast simulates that of the female. The condition may be unilateral or bilateral. The author presents an operation for its correction which has been employed on 32 breasts in a series of 17 cases. There are three classes of benign hypertrophy of a permanent nature which necessitate treatment: (1) periductal connective tissue hypertrophy without adipose tissue change; (2) increase in the amount of both of these elements; and (3) adipose tissue hypertrophy alone.

The author discusses the three classes of cases and then discusses the methods of treatment advocated, which are radiotherapy, endocrine therapy, and operation. Surgical removal of the excess breast tissue seems to be the best method for the correction of the condition. The indications for operation are: to remove the threat of subsequent malignant changes in the enlarged breast; to relieve pain; and to prevent the psychic trauma caused by the feminine appearance of the breasts. The author discusses the operative technique very completely and summarizes as follows:

Mastectomy through a semicircular intra-areolar incision for the correction of gynecomastia is a procedure which offers many advantages over operation through other types of incision. The results of this procedure on 32 breasts were almost uniformly excellent, the insufficient reduction in the size of the breasts in 8 cases and the deformities of the nipples from necrosis in 1 case being the only exceptions. The final appearance in all cases may be favorably compared with the results obtained by other procedures. The absence of noticeable scars such as occur with extra-areolar incisions, together with the reduction of the breasts to normal size and contour, removes the cause of the patient's psychic disturbance. Since the normal appearance of the male pectoral region is achieved by this operation with almost no evidence of operative interference, the patient can indulge in normal activities and expose his chest without fear of ridicule or need of explanation.

The operation requires careful technique and meticulous hemostasis, together with considerable skill, judgment, and patience on the part of the operator to remove a proper amount of tissue along optimum planes and to close the wound satisfactorily in the depths as well as on the surface. It is believed, however, that this type of operation, which leaves inconspicuous scars, should be employed when mastectomy for gynecomastia is to be performed.

PAUL MERRELL, M.D.

TRACHEA, LUNGS, AND PLEURA

Kay, E. B.: Pulmonary Actinomycosis. *Ann. Surg.*, 1946, 124: 535.

Patients with pulmonary actinomycosis present a challenge with regard to therapeutic measures. In a series of 1,330 cases of active actinomycosis collected by Cope, the thorax was involved in 15 per cent. The author discusses earlier treatments and shows that they were unsatisfactory. He presents 2 case reports which serve to illustrate the chronicity of pulmonary actinomycosis and its resistance to therapy. Both cases were subjected to pneumonectomy plus chemotherapy, and the author gives the following summation.

Two case histories of patients with pulmonary actinomycosis are presented. Both patients were treated with an intensive course of sulfadiazine and penicillin therapy, used both alone and in combination, almost continuously, over a period of a year. This therapy appeared to be of value only during the periods of exacerbation and had no permanent effect upon the progress of the disease as a whole. After a year's therapy in both patients without significant benefit, apparent successful results were attained following pneumonectomy. During the postoperative period intensive therapy with sulfadiazine and penicillin given both systemically and intrapleurally, was used. It is believed that patients with pulmonary actinomycosis who fail to improve following intensive, adequate courses of chemotherapy should be treated by pulmonary resection while the disease is still limited to the lung and before the development of multiple thoracic sinuses.

PAUL MERRELL, M.D.

Santy, Bérard, Galy, Magnin, and Papillon: Stenosis of the Large Bronchi in the Course of Chronic Tertiary Pulmonary Tuberculosis in the Adult (Stenoses des grosses bronches au cours de la tuberculose pulmonaire chronique tertiaire de l'adulte). *Arch. méd. chir. app. resp.*, Par., 1942–1945, 15: 189.

The authors discuss stenosis of the large bronchi in the course of pulmonary tuberculosis and describe 10 cases, illustrated with roentgenograms and drawings. This stenosis may occur in a bronchus which drains a tuberculous area, or in a tributary bronchus which drains a normal area. There are certain clinical signs, such as attacks of coughing resembling whooping-cough, asthmatiform attacks, and wheezing, but diagnosis is made largely by roentgen examination and bronchoscopy. Atelectasis frequently occurs in conjunction with this condition. Residual stenosis and bronchiectasis may persist at the base after the healing of the primary apical lesion.

The question of treatment in these cases of bronchial stenosis is a difficult one. The authors do not

think it necessary to give up artificial pneumothorax because of the occurrence of a bronchial stenosis. The decision depends rather on the course of the parenchymatous lesions and on whether any substitute treatment is available. There has been a great deal of discussion as to whether thoracoplasty should be performed on a cavity in the field of a stenotic bronchus. The question is not yet definitely settled. In the one case in which the authors attempted such a thoracoplasty it was a failure, but they do not believe the stenosis of the bronchus was entirely responsible for the failure. For the treatment of the stenosis itself, powdering with cocaine or adrenalin followed by aspiration of the pus and intratracheal instillation of antiseptic oil have been recommended. This treatment brought about improvement in 2 of the authors' cases; 1 patient developed intolerance for novocain, and in 1 case the patient died in spite of the treatment. Dilatation with bougies improves drainage but in the majority of cases does not bring about definite obliteration of the cavity. Surgical removal of the affected and bronchiectatic lobes seems to be the logical treatment in spite of its severity. Although the mortality is high the patient is certain to die if not treated.

The question of whether the bronchial lesions are specifically tuberculous has been much discussed. In the 3 of the authors' cases in which careful histological examinations were made, no specific tuberculous lesions were observed.

AUDREY G. MORGAN, M.D.

Brantigan, O. C.: Open Pneumonolysis. *J. Thorac. Surg.*, 1946, 15: 341.

The advances in medicine and surgery that favorably influence the results in open pneumonolysis are many. These advances, when applied clinically, have eliminated most of the morbidity and mortality associated with past attempts at open pneumonolysis. Pneumothorax should not be carried out when the patient has a large tension cavity. Also, when either fibrotic or tuberculous bronchial stenosis exists, pneumothorax should not be instituted, nor should it be continued when atelectasis occurs. The necessity of doing open pneumonolysis is thus eliminated in this group of patients in whom complications are frequent and serious under pneumothorax therapy alone. Fewer patients need open pneumonolysis because the closed release of adhesions is highly effective. Thus, when a patient is selected for an open operation, no surprise or unexpected contraindications will be found when the pleural cavity is opened.

Rigid indications and contraindications for open pneumonolysis were adopted in an endeavor to keep the operation free of morbidity and mortality. The following indications have been used:

The patient, of course, must be a suitable candidate for pneumothorax. Thoracoscopy must be carried out before a decision is made. If possible, a release of the adhesions will be effected. If closed release cannot be done or if the adhesions are released incompletely, the remaining adhesions are studied with open pneumonolysis in mind. The patient is acceptable for open pneumonolysis if the adhesions are not too extensive and numerous, if the area of lung adherent to the parietal or mediastinal pleura is not greater than the surface area of the operator's palm, and if there is no evidence of pleural exudate, tubercles, or pleuritis. The patient's physical condition must be good enough to warrant the operation. Open pneumonolysis is contraindicated if the conditions are contrary to those enumerated; namely, if extensive adhesions, large areas of lung adherence, pleuritis, pleural tubercles, or pleural exudates are present, or if the patient obviously could not withstand operation. True pleural effusions will contraindicate open operation but small transient effusions will not.

Perhaps the indications for open pneumonolysis have been held entirely too rigid. When thoracoscopy alone was done, only 29.8 per cent of the cases were recommended for open operation. It is possible that more should have been recommended. Hoppe in 1937 subjected to open pneumonolysis only 7 of 220 patients who underwent a closed release of their adhesions or examination alone. However, the rigid indications undoubtedly accounted for the absence of postoperative morbidity and mortality and also for the good end results. If the indications are to be relaxed at all it seems that one might accept more complicated adhesions and larger areas of adherence of the lung to the chest wall for operation. It does not seem feasible that one-half of the pleural surface can be denuded without complications. In such cases thoracoplasty surely would be indicated rather than open pneumonolysis.

From close observation it appears that patients tolerate the administration of general anesthesia better than local anesthesia. However, there is less difficulty with re-expansion under local anesthesia since the patient struggles on recovery from the general anesthesia.

The supine position with an anterior incision is used because there is less chance of aspirating bronchial secretions into the other lung.

The third interspace is selected for the incision. It gives the best exposure. One is sometimes tempted to use the second or fourth interspace, but if this course is followed the exposure is jeopardized. If the exposure is not adequate the adjacent costal cartilage may be divided. A division of the third costal cartilage allows more exposure in the apex, whereas division of the fourth costal cartilage permits greater exposure inferiorly. The breast is elevated superiorly. The skin, breast, fat, and pectoralis major muscle are raised as a single flap. This places the muscle incision inferior to the incision through the interspace.

The lung is always handled with great care in order to eliminate trauma. The adhesions are released in the endothoracic fascial plane, as pointed out by Eloesser and Carter. This step prevents injury to the lung. Much attention is given to hemostasis.

All bleeding points are controlled by suture ligatures of silk. No attempt is made to close the pleura or the intercostal space.

In this small series, as in all other series in which pulmonary tuberculosis is treated, disease in the contralateral lung reduces the chances for favorable end-results. It appears that obliterative pleuritis occurs rather frequently after open pneumonolysis, but it is possible that the judicious use of oleothorax will control the obliterative pleuritis.

JOHN E. KIRKPATRICK, M.D.

Cory, R. A. S.,: Report of a Clinical Trial of Oxidized Gauze in 7 Thoracoplasties. *J. Thorac. Surg.*, 1946, 15: 261.

After using oxidized gauze in 7 thoracoplasties the author draws the following conclusions:

Oxidized gauze (soluble cellulose) is a distinctly valuable addition to the hemostatic armamentarium. It provides, in an easily handled form, a packing material which can be safely left in a wound with no fear of its remaining as an irritating or permanent foreign substance.

Its use in clean wounds does not delay the healing, nor does it interfere with the strength of union of the tissues.

When soaked with blood it has no strength of fiber, but rapidly becomes a sticky mass which is admirably adapted to packing deep narrow cavities; either in soft tissues or between raw surfaces of the bones.

The author expresses no opinion upon its suitability for use in contact with serous membranes, nor does he attempt to say what effect it might have in the presence of deep sepsis in a surgical wound. However, there is no doubt whatever of its value in thoracoplasty. JOHN J. MALONEY, M. D.

Lindskog, G. E.: Bronchiogenic Carcinoma. *Ann. Surg.*, 1946, 124: 667.

In spite of the rapid advances, since 1933, in the technique of surgical resection for the eradication of primary pulmonary cancer, the treatment of bronchiogenic cancer is still disappointing and challenges further effort.

The author presents his experiences in the treatment of 100 consecutive cases of primary pulmonary cancer seen over a 5 year period ending December, 1943.

Of the 100 patients, 82 were males, a ratio of 4.5 males to 1 female. One patient was colored, the expected racial distribution. The average was 54.8 years, the youngest patient being 22, and the oldest above 70 years of age.

In 60 of the patients, the first observed symptom was cough, pain in the chest, or a grippe-like "cold." Six had early dyspnea, and 4 showed hemoptysis as an early complaint. Three had an acute pneumonic onset, 9 had vague complaints of weakness and weight loss, and 14 had initial symptoms related to metastases or extension of the tumor beyond the lung.

In 98 patients the average duration of symptoms prior to admission was 6.7 months. There was no significant difference in duration between operable and inoperable cases. The primary lesion was on the right in 51 cases and on the left side in 47 cases. The upper lobes and stem bronchi above the upper lobe orifice were involved in 69 per cent of the cases. In 2 cases the primary focus could not be determined.

Positive tissue diagnosis was obtained in 82 cases —in 77 living patients and in 5 at autopsy. In the remaining 18, the methods employed to give a positive biopsy failed, or the patients refused to submit to the indicated procedures. These patients exhibited a typical clinical course and all subsequently died.

In 65 patients the condition was inoperable when first seen, and 3 patients refused treatment. In 36 of these the carcinoma was proved by biopsy of metastases or by involvement of important nerves; in 3 patients the carina or trachea was found to be invaded; in 18, presumptive evidence of inoperability was present (roentgenographic or bronchoscopic evidence of mediastinal distortion); 7 patients were moribund; and 1 patient had had radon treatment elsewhere, with no trace of the original lesion.

Surgical exploration was carried out in 32 cases. In 20 of these, extension to hilar or mediastinal nodes, or to the parietal pleura was observed. Local extension to the parietal pleura was not considered a contraindication to resection, and a block resection of the locally involved area was carried out in several cases.

Of the 12 resections, 10 pneumonectomies and 2 total upper lobectomies were carried out. Complications were observed in 10 of these: a putrid abscess in 1 patient, local parietal pleural extension in 3 patients, tuberculous hilar nodes in 1 patient, an obstructive pneumonitis with pneumococcal empyema in 1, and a massive pleural effusion without gross pleural involvement in 1; invasion of the hilar (intratracheal) nodes was observed in 3 patients, and contralateral metastasis was proved later in 1 patient.

The average age of the patients was 54, and the oldest patient was 68 years of age.

Thirty-eight patients who were given only diagnostic or symptomatic care survived for an average period of 5 months. Twenty-nine patients received high voltage roentgen therapy, radon implantation, or both. All are dead after an average survival of 7.4 months. Treatment was of doubtful value as a means of prolonging life but was effective in producing relief from pain, decrease of dyspnea, improved aeration and bronchial drainage, as well as in a psychotherapeutic way.

There were no operative deaths among the 20 patients in whom exploration, without resection, had been carried out. Nine patients who had had no subsequent x-ray treatment survived for an average period of 8 months. Patients who had been treated by irradiation lived for an average period of 11.8 months.

Three patients died in the hospital following total pneumonectomy at 12, 42, and 80 days after oper-

ation. Six of the patients who had undergone resection died subsequently of metastases at intervals of from 3 to 26 months after operation.

Four patients are living—one, 5.5 years after pneumonectomy for a squamous cell carcinoma, one, 4.5 years after pneumonectomy for a squamous cell carcinoma, and one, 2.5 years after lobectomy for a squamous cell carcinoma; one patient with anaplastic carcinoma of the mediastinum is alive and working 3.5 years after roentgen treatment. This last patient is the only one of the irradiated group in whom a lasting effect was obtained.

Two patients were submitted to pneumonectomy for solitary carcinoma metastases from the uterus and urinary tract, with survivals of 24 and 5 months, respectively. The author did not include these cases in his statistical survey.

ROBERT R. BIGELOW, M.D.

Cames, O. J., Cesanelli, A., and Tricerri, F. E.: Surgical Treatment of Lung Cancer. Personal Experience (Nuestra experiencia en el tratamiento quirúrgico del cáncer de pulmón). *Prensa méd. argent.*, 1946, 33: 1621.

Between the end of 1943 and May, 1946, 107 patients with bronchogenic carcinoma were seen by the authors. Of this number, 21 (21.4%) were considered suitable for exploration and 12 of the latter group were operable (57.1% of the cases explored). Eleven pneumonectomies and 1 lobectomy were done. There were 3 deaths (25%) from resection, and 1 (4.76%) from an exploratory thoracotomy. A bronchopleural fistula occurred three times after resection, and empyema occurred in 25 per cent of the resected cases.

The contraindications to exploration are demonstrable metastases, laryngeal, cervical sympathetic, or diaphragmatic paralysis, hemorrhagic pleural effusion, skeletal involvement, and general debility of marked degree. The bronchoscopic signs of inoperability include involvement of the trachea, and widening or fixation of the coryna.

The authors urge early diagnosis, including exploratory thoracotomy for the lesions peripherally located which are otherwise inaccessible for accurate diagnosis.

Twelve brief case reports and numerous illustrative roentgenograms are appended.

HIRAM T. LANGSTON, M.D.

Langer, L. and Bracco, A. N.: Segmental Pulmonary Resection. Its Indications (Resecciones pulmonares segmentarias. Sus indicaciones). *Prensa méd. argent.*, 1946, 33: 1854.

This article is based on the experiences in the service of Richard H. Overholt of Boston. The technique of segmental resection is being described in an article by Overholt and Langer (in press) and is based on such interventions carried out on 32 patients with bronchiectasis (22), chronic abscess (4), tuberculosis (4), hamartoma (1), and myxoliposarcoma (1). No deaths occurred. The only significant postoperative complication was empyema, which occurred in 15 per cent.

The authors review the concept of bronchopulmonary segmental arrangement, applying it to the intralobar areas. They adopt essentially the nomenclature of Huber and Jackson. Attention is called to the occurrence of interlobar vascular communications.

The segments are identified by bronchoscopy, bronchography, and at operation by occluding the corresponding bronchus and inflating or deflating the lung to indicate the segmental boundary in the parenchyma.

Segmental resection is useful for such conditions as bronchiectasis, chronic abscess, benign or unidentified tumors, and isolated metastatic neoplasms. Tuberculosis, possibly simple bronchial cysts, localized emphysematous bullae, and even actinomycosis or hydatid cysts are suggested as other possibilities.

The segmental approach is useful in providing a means of eradicating the areas of disease without sacrificing normal functional lung; however, the caution is sounded that resection should be adequate by including all the involved areas, particularly in bronchiectasis. This conservation of lung may permit operations for multilobar involvement.

In tuberculosis the actual extent of disease as found at operation frequently precludes the restriction of resection to lobular segments, even though the procedure may be used in selected cavernous lesions, tuberculomas, and in obviating pneumonectomy when the disease has crossed an interlobar fissure.

The various indications are discussed, brief case reports are given, and illustrative roentgenograms and photographs are appended.

HIRAM T. LANGSTON, M.D.

ESOPHAGUS AND MEDIASTINUM

White, M. L., Jr., and Birdsong, M.: Congenital Esophageal Atresia with Tracheoesophageal Fistula. *Surgery*, 1946, 20: 548.

Although congenital atresia of the esophagus with tracheoesophageal fistula is not rare, interest in the condition has recently received a stimulus from successful reports of operations for the once uniformly fatal lesion. In 1929, Vogt summarized the variations of this anomaly in the following classification which is still widely accepted:

Type 1, complete absence of the esophagus (extremely rare); type 2, blind end to both upper and lower segments of the esophagus, with no tracheal communication from either segment (rare); type 3a, upper segment with tracheal communication and a blind lower segment (rare); type 3b, a blind upper segment and a communication between the lower segment and the trachea (common type); type 3c, communication of trachea with both upper and lower segments (rare). Thus, there is only one frequent type, i.e., type 3b, which comprises about 90 per cent of the cases. Inasmuch as all attempts at

reconstructing a functional esophagus were failures until 1941, the report of a single case is thought justified.

The patient was a white female infant. It was noticed at birth that there was much pharyngeal mucus which required aspiration, and a marked but temporary laryngeal stridor. After 24 hours, with every feeding the child would regurgitate and become somewhat cyanotic. Because of repeated regurgitation of everything taken by mouth, a small catheter was passed into the esophagus on the morning of the fourth hospital day, and an obstruction was met about halfway down the length of the esophagus. The patient was taken to the x-ray department and 2 c.c. of iodized oil were injected into the esophagus by catheter. A complete atresia of the esophagus with a large bulbous upper segment extending as far down as the second dorsal vertebra was noted on fluoroscopy. Roentgenograms confirmed the fluoroscopic findings and also showed a large amount of gas in the stomach and intestinal tract. There was no evidence of pneumonia. The diagnosis of atresia of the upper portion of the esophagus with tracheoesophageal fistula of Vogt's type 3b was made, and the patient was prepared for immediate operation.

Under local infiltration anesthesia the large upper blind pouch of the esophagus was easily identified and dissected free as was the lower segment also, since it extended almost to the upper segment. Although much smaller in diameter it appeared to have a lumen adequate for anastomosis. The lower segment was attached to the trachea about ½ cm. inferior to the upper segment. A tracheoesophageal fistula at this point was isolated; after transfixion, the ligatures were placed in the wall of the fistula close to the trachea, the fistula was divided, opening the lumen of the distal segment of the esophagus. The lumen of the upper segment was entered by amputating the bulbous tip of the upper segment.

A No. 8 French urethral catheter was passed into the stomach through the distal segment of the esophagus, and its upper end was passed through the upper segment into the pharynx where it was retrieved by the anesthetist. The two ends of the esophagus could then be brought together over the catheter and held by traction sutures.

The diagnosis in the case reported was suspected when the child began to vomit her food immediately after ingestion, and in the intervals to eject continually a small amount of foamy saliva. Cyanosis, especially at feeding time, was also a noteworthy symptom. These are classic signs of the type 3b tracheoesophageal fistula.

There would seem to be no difficulty in choosing between the one-stage direct anastomosis and the indirect method from the point of view of functional end-results. With the former, the patient has, following a single procedure, an esophagus approximating the normal; with the latter, he has, after a prolonged convalescence marked by multiple plastic operations, only a substitute for an esophagus. The data are as yet too incomplete to permit any positive conclusions on the relative operative risk of the two primary procedures. There seems only one reason for the indirect approach, namely, an anatomic condition that will not permit direct anastomosis, which, unfortunately, is frequently encountered.

This case is believed to be the fourth recorded case which did not include a supplementary gastrostomy. When gastrostomy can be avoided, the postoperative course is transformed from a difficult feeding and nursing problem of indefinite duration into one of parenteral maintenance for a few days, followed permanently by normal oral feedings. Penicillin, by lessening the incidence of anastomotic leaks, will probably decrease the need for gastrostomy.

The three important points in the postoperative care are the prevention of infection, the control of body temperature, and the maintenance of nutrition.

There should be the closest co-operation between the thoracic surgeon and the pediatrician in the handling of these cases.

STEPHEN A. ZIEMAN, M.D.

Janes, R. M.: Diverticula of the Lower Thoracic Esophagus. *Ann. Surg.*, 1946, 124: 637.

Diverticula of any portion of the thoracic esophagus are rare, only 116 being reported in the literature up to 1934. This probably does not represent the true frequency of the disease. Improvement in roentgenological examinations of the esophagus will undoubtedly lead to more frequent recognition of this condition. Giant diverticula remain of interest.

Thoracic esophageal diverticula are described as of the traction or pulsion variety. The former are conical and result from fixation of a point on the outer esophageal wall to an inflammatory tuberculous node.

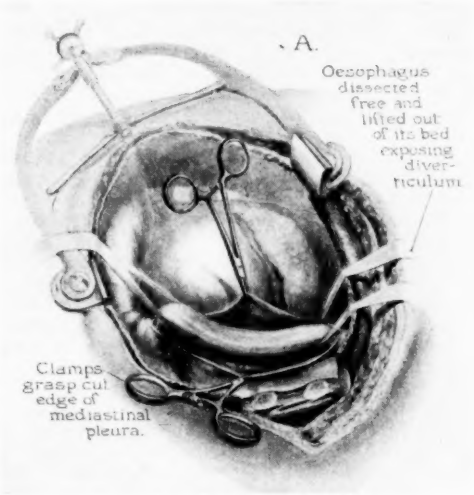

A.
Oesophagus dissected free and lifted out of its bed exposing diverticulum
Clamps grasp cut edge of mediastinal pleura.

Fig. 1 (Janes). Exposure obtained.
(Courtesy of J.B. Lippincott Co.)

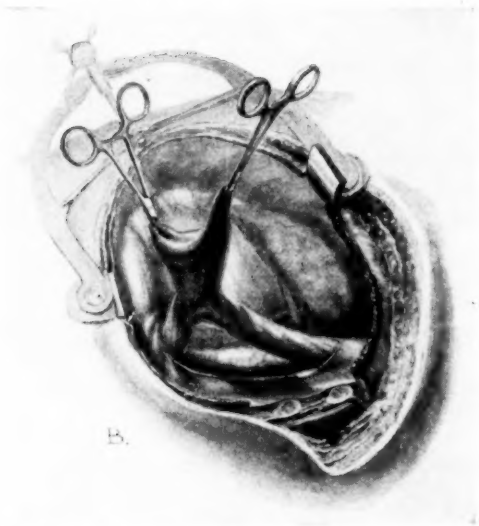


Fig. 2 (Janes) Diverticulum freed and held up by clamps.

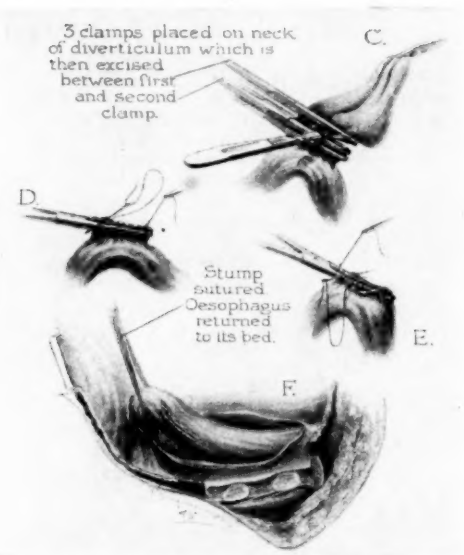

3 clamps placed on neck of diverticulum which is then excised between first and second clamp.
C.
D.
Stump sutured Oesophagus returned to its bed.
E.
F.

Fig. 3. Method of excision and suture.

Their wide open mouths seldom catch food, and they are generally asymptomatic except for a rare perforation. The pulsion type are said to result from herniation of the mucus membrane through the muscular wall. The diverticula removed in this series had rather thick walls formed of squamous epithelium, submucosa, muscularis mucosa, and a layer of fibrous tissue. In all cases there was marked infiltration of inflammatory cells in the submucosal area.

The etiology of these diverticula is unknown. Some are associated with cardiospasm and are regarded as a rare complication of that condition. Some additional factor, either congenital weakness or degenerative change in the esophageal wall, may be responsible.

Barrett has suggested a third type of esophageal diverticulum, the traction-pulsion, in which a combination of etiologic factors is said to exist.

The outstanding symptom is difficulty in swallowing. It may be first noted with liquids or be more troublesome with solids. Substernal pain sometimes referred to the interscapular region is nearly always present. Vomiting or regurgitation occurred in all cases. Loss of appetite, weight loss, and sometimes extreme dehydration may follow. The symptoms seem to occur in episodes with the patient free of discomfort for long periods.

Diagnosis is based on the clinical history and demonstration of a diverticulum on barium study of the esophagus. In 2 cases a fluid level on the plain chest roentgenogram led to discovery of the lesion.

Diverticula discovered on routine examination need no treatment. Those associated with symptoms should be treated surgically.

The symptoms probably are initiated at times by an inflammatory swelling. Patients with large diverticula should be encouraged to be operated on while still in good condition. There is danger of ulceration, perforation, and hemorrhage. When the operation is delayed too long, the patient becomes seriously ill with malnutrition and dehydration and the danger of operation is much increased.

Preoperative malnutrition and dehydration should be corrected by continuous feeding through a duodenal tube. The esophagus and diverticulum should be washed out with a tube on several occasions for 24 hours preoperatively. The tube in the esophagus at operation aids in identification of the esophagus and diverticulum. It is used after operation for aspiration of air and fluid from the stomach for the first day or two and later for feeding. Swallowing is permitted after the fifth day. Intratracheal closed anesthesia is necessary because of the danger of opening into the right pleural cavity during the dissection. Blood should be replaced as necessary.

A posterolateral approach through the seventh or eighth intercostal space is satisfactory. The mediastinal pleura is incised for 3 inches in the region of the diverticulum, and the esophagus and diverticulum are gently isolated and lifted forward on tapes (Fig. 1). The sac usually arises from the posterior aspect of the esophagus and joins it by a neck several centimeters in diameter (Fig. 2). Then 3 Kocher forceps are placed across the neck of the diverticulum which is then divided with a cautery between the 2 distal clamps. The second clamp is removed and the

fringe of tissue left is oversewn with a running suture of chromic catgut on an atraumatic needle. The third clamp is removed and the first layer of sutures is invaginated with a row of Lembert sutures (Fig. 3). There is no encroachment on the lumen. The divided mediastinal pleura is sutured behind the isolated portion of the esophagus in order that infection, if it should occur, will involve the pleural cavity rather than the mediastinum. The chest is closed with a water sealed intercostal drain to the site of operation. The author suggests the use of penicillin postoperatively for from 5 to 7 days to lessen the danger of local or pulmonary complications.

The author then gives the case reports of 6 cases of diverticula of the thoracic esophagus. The first 4 were operated on without a mortality. The patients had complete relief of symptoms. Preoperative and postoperative roentgenograms are shown.

ROBERT R. BIGELOW, M.D.

Sweet, R. H.: Carcinoma of the Midthoracic Esophagus. *Ann. Surg.*, 1946, 124: 653.

Any operative treatment for carcinoma of the esophagus should be undertaken with the aim of prolonging life, effecting a possible cure, and relieving the distressing obstruction produced by the growth.

Until recently the Torek operation was the only available method of removing a carcinoma of the midesophagus. The Torek operation fails to provide for removal of the subdiaphragmatic pericardial nodes and the left gastric nodes, both of which were involved by tumor in 50 per cent of the author's series of 32 cases. With the Torek operation, the principle of cancer therapy (wide excision of the primary tumor and of as many of the regional lymph nodes as possible) is violated; it fails to provide satisfactory palliation, as has been shown in the author's report of 14 cases. All but 1 of the patients died of recurrence or metastases, and 10 patients died before the external esophagus was completed.

A satisfactory technique has been developed for radical resection of the local disease and of at least 3 of the 4 groups of regional nodes usually invaded. The author states that use of the method offers greater promise of a cure, and, in addition, the intrathoracic esophagogastric anastomosis permits the patient to swallow normally. Because of the palliation afforded by this procedure, it is believed to be far superior to the Torek operation.

The author describes his technique for esophagectomy with high intrathoracic esophagogastric anastomosis. Under intratracheal ether-oxygen anesthesia an incision is made over the entire length of the eighth rib, which is resected. Often one or more ribs posteriorly must be divided to provide access to a high tumor or to perform a high anastomosis.

First, the resectability of the growth must be determined by incising the mediastinal pleura and beginning the dissection anterior to the esophagus. Here invasion of the left main bronchus, extensive involvement of the region around the inferior pulmonary vein, or fixation to the aorta may make the tumor inoperable. If adhesions to these structures can be divided, dissection of the posterior attachments is begun. In the author's cases, this procedure was delayed in order to avoid interference with the blood supply of the midesophagus, as the result of dividing one or more of the esophageal arteries arising from the aorta. After the posterior attachments are divided, the tumor must be freed from the right mediastinal pleural reflection. Sometimes a portion of this pleura must be excised. This was done without complication in 3 of the 32 cases reported. With the closed method of anesthesia, the lung is kept expanded, and the chest is closed without any attempt to repair the pleural defect. In a few cases a small portion of the adjacent lower lobe of the right lung (if it is fixed to the growth) must be removed. The lung defect is closed with a continuous suture of 00 catgut on an atraumatic needle.

After the esophagus is dissected free from the level of the aortic arch downwards, the diaphragm is opened from the esophageal hiatus to the costal margin. The phrenic nerve is crushed for diaphragm immobilization. The upper two-thirds or more of the stomach is then freed in order to allow the fundus to be brought to a high level in the chest for anastomosis. The gastrolienal ligament is divided and the left gastroepiploic vessels and the vasa brevia are cut and tied. The spleen is retracted and the gastrocolic omentum is divided as far as the pylorus, being careful to avoid injury to the right gastroepiploic vessels. The attachments of the cardia and lower esophagus, including branches of the superior suprarenal, inferior phrenic and the pericardiophrenic vessels, are then cut. The left gastric artery is cut and tied close to its origin from the celiac axis, and then the stomach fundus can be placed without difficulty in the apex of the chest.

The stomach is divided between the clamps at the cardia, with care to remove the lymph nodes near the lower esophagus, cardia, and left gastric vessels The distal portion is inverted by means of two layers of continuous sutures of fine chromic catgut reinforced with a layer of interrupted silk sutures. A rubber glove is tied over the lower end of the esophagus. After the stomach is mobilized, the mediastinal pleura is incised and the esophagus in the superior mediastinum is freed by blunt dissection.

Whenever possible, dissection behind and above the arch of the aorta is avoided, and the anastomosis is performed just below the arch.

At a high level on the fundus of the stomach a circular incision of appropriate size is made through the serosal and muscular coats. A suitable site for the anastomosis is chosen several centimeters above the upper limits of the growth, and an outer layer of mattress sutures comprising the first layer of the posterior half of the anastomosis is placed and tied. A Wertheim clamp is placed on the esophagus several centimeters distal to the site of the anastomosis and the muscularis of the posterior esophageal wall is incised. The resulting muscle edge of the esophagus is sutured to the muscle edge of the stomach.

The posterior half of the esophageal mucosa is then incised and the circular portion of the stomach outlined by the initial incision is excised. The gastric contents are aspirated. The posterior layer of mucosal sutures is then applied. With bent blade scissors, the anterior wall of the esophagus is incised and the specimen is removed. With the use of fine silk throughout, the anterior three layers of the anastomosis are completed. A series of interrupted sutures are used to fasten the stomach to the parietal pleura to relieve pull on the anastomosis. The diaphragm edges are fastened to the pyloric antrum and approximated. Penicillin (50,000 units) is injected half in the thoracic and half in the abdominal cavity before closure. The incision is closed anatomically with silk sutures. A catheter for closed suction drainage is brought out through a stab wound one interspace lower posteriorly.

At completion of the operation the stomach is dependent for its blood supply on the right gastric and the right gastroepiploic arteries. The continuous arcades of the gastroepiploic arteries, the anastomosis between the right and left gastrics, and the intercommunicating branches in the stomach wall are essential for nutrition of the anastomosis site, hence great care in handling the stomach throughout the entire operation must be exercised. The esophagus has a segmental blood supply. If the anastomosis can be made below the arch, the nutrition at the cut end will be adequate because of the small arteries arising from the arch and bronchial arteries. If the superior esophagus must be mobilized its only blood supply arises from the inferior thyroid artery. Therefore the esophagus, when pulled anterior to the arch of the aorta, must be divided at a high level within the chest in order to avoid necrosis at the cut end. Even though it is more difficult, from a technical standpoint, to do this, it may mean the difference between success and failure of the operation.

The thoracic duct was tied and divided in 3 of the cases with no ill effects. In a fourth case the duct was injured but not tied. This patient died of a chylous hydrothorax.

To avoid stricture at the anastomosis, the author recommends (1) avoidance of using crushing clamps on either the gastric or esophageal side, (2) the use of knife and scissors to cut the esophagus and stomach instead of cautery or chemical caustics, and (3) the use of fine interrupted sutures instead of constricting running sutures. A circular opening in the stomach wall for the anastomosis may also be of importance.

During 1944 and 1945, 66 patients with midthoracic carcinoma were seen and 41 were operated on. In 9 of these, resection was impossible. Thirty-two (48.5%) had resections with high intrathoracic esophagogastric anastomosis. The high resectability is due to the feeling that the growth should be removed, whenever possible, for palliative reasons. Of the 9 patients in whom resection was impossible, 8 recovered and left the hospital only to die a few months later. The ninth patient died soon after operation, of widespread lymphatic invasion.

Of the resected cases, one-half of the patients were over 65 years of age. In 14 of the 32 patients it was impossible to do the anastomosis below the arch of the aorta. Complications developed in 13 patients, only 3 of whom were in the group with anastomosis below the arch. There were 2 postoperative deaths as compared to 6 in the group with the anastomosis above the arch.

Cardiac disorders caused the death of 5 patients, only one of these being in the subaortic anastomosis group. Three patients developed sepsis—empyema, mediastinitis, and a wound infection of Staphylococcus aureus which responded to penicillin. Chylous hydrothorax developed in 2 patients. In 1, the condition came on rapidly and was fatal; in the other, it developed slowly and the patient died several months later of metastases. One patient developed a sublethal pulmonary embolus and recovered after superficial femoral vein ligation. One patient died after a pulmonary atelectasis and failed to respond to treatment. One patient recovered from a transitory surgical shock. ROBERT R. BIGELOW, M.D.

MISCELLANEOUS

Robertson, R.: Crushing Injuries of the Chest. *J. Thorac. Surg.*, 1946, 15: 324.

Crushing injuries of the chest are commonly encountered in civilian practice and for the most part are not adequately treated. They may cause anoxia and death from the following disturbances of the delicately balanced cardiorespiratory function: (1) hemorrhage, (2) cardiac tamponade, (3) respiratory failure (mechanical asphyxia), and (4) acute pulmonary edema.

In the treatment of crushing injuries of the chest it is essential to diagnose the pathological condition accurately and to understand clearly its effect on the physiology of the respiration and circulation. A crushing injury of the chest may fracture numerous ribs and thereby cause paradoxical respiration from a flapping chest wall. A fractured rib may puncture the lung or blood vessels or, even in the absence of rib fractures, a sudden crushing injury may tear these structures. The following pathological conditions should be kept in mind: (1) airway obstructed with blood, (2) flapping chest wall, (3) hemothorax, (4) tension pneumothorax, (5) massive atelectasis, (6) mediastinal hematoma, (7) mediastinal emphysema, (8) hemopericardium, (9) diaphragmatic hernia, (10) acute gastric dilatation, and (11) air embolism.

Oxygen should be administered immediately at the rate of from 8 to 10 liters per minute, even before cyanosis develops. The first signs of anoxia, rapid pulse, dyspnea, and restlessness may appear sometime before cyanosis develops. An immediate portable x-ray examination should be ordered without interruption of treatment, for although the diagnosis will usually be clear on physical examination, some cases will be most misleading and x-ray views will be lifesaving.

Blood obstructing the airway should be removed by suction with a catheter passed through the nose into the bronchus.

A flapping chest wall with painful and paradoxical respiration can be relieved by adhesive strapping encircling the chest. Morphine may be given intravenously with caution to relieve pain. Depression of the cough reflex is not a disadvantage in the early treatment but tends to prevent further hemorrhage.

Loss of blood is replaced by transfusions with large quantities of citrated blood, or, if this is not available, serum.

A hemothorax should not be aspirated for 3 or 4 days, or until danger of intrapulmonary hemorrhage is over, when torn pulmonary vessels have had sufficient time to become firmly thrombosed. The hydrostatic pressure of large quantities of blood in the thorax may cause cardiac tamponade, but on the other hand, it will tend to stop bleeding from the lung and the chest wall; therefore, if there are signs of cardiac tamponade, aspiration should be only in amounts sufficient to relieve the symptoms and the blood should be replaced with air sufficient to keep the lung collapsed.

Aspiration must be persistent, until the lung is completely and permanently re-expanded.

Bronchial secretions or hemorrhage should be removed by aspiration rather than hard coughing.

A diaphragmatic hernia is almost the only indication for immediate thoractomy in crushing injuries of the chest. In every general hospital, a team trained and equipped to treat crushing wounds of the chest would save many lives.

STEPHEN A. ZIEMAN, M.D

Betts, R. H.: The Initial Surgery of Thoracoabdominal War Injuries. *J. Thorac. Surg.*, 1946, 15: 349.

The term, "thoracoabdominal wound" denotes injury to the thorax and abdomen by the same missile. Such a wound necessitates actual penetration through the diaphragm, or transmission of sufficient force to produce injury in the other serous cavity. The vast majority of thoracoabdominal war injuries are due to a missile actually traversing the diaphragm. Casualties with separate wounds of the abdomen and thorax present a different problem and these are better termed "combined thoracic and abdominal injuries." The discussion is limited to true thoracoabdominal wounds.

A working diagnosis is readily apparent in the majority of war wounds, including thoracoabdominal injuries. A thorough inspection of all surfaces of the thorax and abdomen, both anteriorly and posteriorly, for wounds of entrance or exit, plus the usual examination and roentgenological procedures, is sufficient in most cases. The pleura can be assumed, with reasonable accuracy, to follow the outline of the periphery of the ribs and costal cartilages.

Any missile passing through the area from the level of the twelfth rib posteriorly to the level of the fourth rib anteriorly (on expiration) may or may not have entered both the pleural and peritoneal cavities. A large number of soldiers are wounded while lying prone, and the increased abdominal pressure further raises the upper limit of the diaphragm.

Resuscitative methods and proper preoperative care are of utmost importance to both the thoracic and abdominal casualty. If the wound is a thoracoabdominal one, certain concessions may have to be made that are not ideal from one or the other viewpoints. Thoracic physiology should be restored to as nearly normal as possible before operation, and the length of time this takes, within limits, is unimportant from the thoracic standpoint. Time is of great importance in cases of abdominal injury. It is, therefore, often necessary to treat patients with a thoracoabdominal injury somewhat differently than patients with either straight thoracic or abdominal conditions are treated. Replacement therapy with blood, plasma, and electrolytes can be used quite freely for abdominal cases, but there is some danger of overloading the already deranged cardiorespiratory system of the thoracic casualty.

Two other factors need to be mentioned in regard to resuscitative measures for thoracoabdominal cases. The first factor is that of the influence of disturbed cardiorespiratory physiology on the production and prolongation of shock. The second is a similar influence due to severe peritoneal or pleural cavity contamination. The main causes of a disturbed cardiorespiratory balance in the recently injured man are as follows: The presence of blood and/or air in the pleural cavity with diminution of the functioning pulmonary parechyma; the presence of large pulmonary hematomas; the splinting effect of pain from an injured thoracic cage; and excessive blood or mucus in the tracheobronchial airway.

Shock therapy must be continued during and after operation. It is therefore wise to insert a needle, or cannula, in the saphenous vein preoperatively, because it is not as likely to become dislodged by the necessary manipulations of the patient as if it were in a vein of the arm.

A Levine tube for stomach decompression is best inserted soon after admission, as many patients have surprising degrees of gastric dilatation which, by elevating their diaphragm, further hampers adequate oxygenation. Also, the period of time since the ingestion of food is not a good criterion of the amount of material in the stomach since a large residue is often present many hours after eating. This may be due to pylorospasm or lessened gastric motility from the nervous tension of battle.

Endotracheal oxygen-ether by the closed method was the author's choice of anesthesia. Periodic aspirations of material from the trachea and bronchi were essential. Positive pressure was useful to expand the lung periodically during operation and to encourage pulmonary expansion at the end of operation, especially if the thorax was closed without drainage.

In selecting the operative approach, prime consideration should be given to the expected intrathoracic

and intra-abdominal damage. There are distinct advantages to the thoracic approach for operations that can be done from above. These can be enumerated briefly as follows: It facilitates repair of some upper abdominal organs, such as the spleen and upper portion of the stomach. Colostomies can be done, when indicated, through a muscle-splitting incision at a greater distance from the main incision than is possible through the abdominal exposure. Patients can be carried in a lighter plane of anesthesia, as abdominal relaxation is not necessary. The diaphragm can be more easily and satisfactorily repaired from above than from below. In patients with marked pleural contamination, the pleural cavity can be thoroughly washed out with saline solution to reduce the degree of infection. The postoperative course is smoother following thoracotomy than it is after a celiotomy, since there is less pain and less tendency toward pulmonary complications.

There are certain limiting factors to the transdiaphragmatic approach. Lesions of the terminal 18 inches of the small bowel and the colon, except for the transverse, splenic flexure, and proximal descending portions, usually cannot be exposed adequately from above. For cases with minimal thoracic involvement, the abdominal approach prevents entrance to both the abdominal and the pleural cavities. It should be pointed out, however, that any except the smallest hole in the diaphragm constitutes a "sucking wound" of the thorax when the abdomen is open just as much as does a hole through the thoracic cage. Not infrequently, patients will develop pulmonary embarrassment from the aspiration of air through the hole in the diaphragm while abdominal repair is being completed. If this condition is permitted to continue and is unrecognized, serious results may follow. Also, bowel or stomach contents in the peritoneal space may be aspirated into the pleural cavity. Diaphragmatic repair, instead of being relegated to the conclusion of the operative procedure, should be the first step when using the abdominal approach.

Correction of cardiorespiratory imbalance is the most important phase of the preoperative preparation of casualties with thoracoabdominal injuries. Thoracentesis, intercostal nerve block, and maintenance of a free airway are the three essentials of so doing.

The diagnosis of thoracoabdominal injury is often difficult if the wound is in the region of the diaphragmatic sulci. Exploration should be done in any case about which there is reasonable suspicion as to pleural involvement.

The mortality rate in thoracoabdominal injuries is directly proportional to the severity of the wound. The rate increases progressively as the number of injured abdominal organs rises. Likewise, right-sided injuries do better than left-sided ones, since in the former the liver is frequently the only abdominal organ involved.

In the series of 903 thoracoabdominal injuries treated by the surgical teams of the Second Auxiliary Surgical Group, the overall mortality was 27.3 per cent. For the severely wounded thoracoabdominal casualty surviving the first postoperative day, the syndrome of "post-traumatic uremia" is his greatest hazard. In a series of 48 cases, with 11 deaths, 6 of the fatalities were due to this syndrome.

It has been demonstrated that more patients with thoracoabdominal wounds die of pulmonary complications than succumb to complications within the peritoneal cavity. This indicates that reducing the incidence of pulmonary complications in the immediate postoperative period by careful attention to securing a completely expanded lung against an intact chest wall, and the maintenance of a free airway should result in a lowering of the mortality rate for this group of casualties.

JOHN E. KIRKPATRICK, M.D.

Minkin, S. L.: The Causes of, and Indications for, Re-Operation Following Gunshot Wounds of the Chest. *Vrachebnoe Delo*, 1946, No. 6, 331.

The author's experience extends over 600 cases of perforating wounds of the chest seen in evacuation hospitals deep behind the front lines; these cases had already been operated upon at least once.

In reviewing the indications for reoperation, the author cites in the first instance an inadequate primary operation. Reoperation was done 6 times in cases in which the first operation had been a Connors' operation, and 7 in which the first was a Heller operation. In these patients the condition was too far advanced when the first operation was instituted. Nine patients underwent a secondary operation following a restricted Schede operation, which had not been carried out thoroughly and extensively enough because the patient's general condition at operation forbade a more radical procedure, or the first surgeon had failed to appreciate the requirements of the individual case. Five of these proved to be the author's own patients.

The second principal cause of nonhealing wounds and fistulas is the presence of isolated cavities, often multiple, which are connected by narrow fistulous tracts with the main cavity for which the patient was originally operated upon. These are not always detectable even by roentgenological methods. The best method to avoid missing such a condition is a careful probing of the original cavity.

A third indication of re-operation is the presence in the pleural cavity of a foreign body. Foreign substances gain access to the cavity either at the time of injury or operation or during the changing of the dressings (drains, tampons, needles). Re-operation for this cause was performed by the author in 8 instances. In 4 of these the roentgenological examination enabled a preoperative diagnosis of the condition; in the other 4 the foreign material was found by chance during the operation itself (bits of rubber glove, pieces of tampon). In 2 other cases, in addition to these 8, the foreign body lay outside of the pleural cavity in a sinus. In 1 of these patients the body was lodged in the peripheral tissues of the lung and par-

tially protruded into the pleura. In all of these patients the secondary operation resulted in immediate cessation of the suppurative manifestations and rapid healing. Such cases demand careful palpation with the finger of the pleural cavity.

A fourth indication is a localized osteomyelitis of the rib. In these cases the surgical technique employed must cover three possibilities. In the first instance, in which the fistula does not connect with the pleural cavity, the technique does not differ from that for osteomyelitis in any other bone of the body; but when the process connects with a residual pleural pus pocket the procedure should be radical with wide exposure of the affected rib and cavity. The third possibility is the coexistence of costal osteomyelitis and a pleural cavity which are not connected but nevertheless mutually influence each other.

When the osteomyelitic process is located in the cartilage of the rib, roentgenography offers the best means of revealing the condition.

As a fifth cause of nonhealing of wounds and fistulas the author admits the possibility of secondary epithelization of the fistulous tract, as described by Eggers. The author does not mention any experience with this condition in his material, but nevertheless emphasizes thorough removal of the entire fistulous tract at operation and early removal of drains as prophylactic measures. In general, the author prefers to err on the side of premature suppression of drainage, especially of the Bulau type of closed drainage, as soon as the discharge of pus has ceased and the roentgenological examination shows the absence of fluid in the cavity being drained. The drain may be reintroduced if manifestations of fluid retention develop.

As a sixth indication for re-operation the author describes a condition of localized thickening and cicatrization of the parietal pleura. In 4 of his patients such an area seemed to harbor infection, and wide exposure with removal of the entire anterior wall of the cavity, or at least localized removal of the thickened area, resulted in prompt cessation of the symptoms and complete healing.

As a seventh indication of nonhealing of wounds and fistulas of the chest is cited the presence of lung abscess and bronchial fistula. These cases will be the subject of a detailed report later on; here the author merely mentions their marked tendency toward spontaneous healing. In only 4 of the 26 patients in this group, the bronchial fistulas required a secondary operation.

An eighth indication for re-operation is given as the association of a perforating wound of the chest with a pulmonary tuberculous process. In all of the author's patients with this association the condition had been recognized too late to prevent the fatal termination. The association is merely mentioned in order to emphasize the necessity of early diagnosis and a primary operative procedure (removal of the hemothorax), of the immediate institution of hygienic and dietary measures, and the avoidance, if possible, of a secondary operative procedure.

JOHN W. BRENNAN, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Ivanissevich, O., and Defazio, F.: Gelatinous Disease of the Peritoneum (Enfermedad gelatinosa del peritoneo). *Sem. méd.*, B. Air., 1946, 53: 554.

A case of pseudomyxoma of the peritoneum, also called "Pean's disease" or "gelatinous disease of the peritoneum," is reported by the authors. A man 43 years old noticed a gradual increase in the size of his abdomen. Nine months after the onset of the disease an operation was performed and 7 liters of fluid were withdrawn from the abdomen. The examination 6 months after the operation revealed an enormous enlargment of the abdomen which was slightly painful to palpation. Rather large nodules could be palpated through the abdominal wall. Paracentesis furnished fluid containing lymphocytes and endothelial cells. A tentative diagnosis of hydatidosis was made. The operation disclosed microcystic tumor formations, resembling grapes, scattered all over the parietal and visceral peritoneum and omentum. A large gelatinous mass was present in the abdominal cavity. The histological examination of a biopsy specimen established the diagnosis of pseudomyxoma.

Three months after the last operation the patient was readmitted and appendectomy was performed. The appendix was dilated and surrounded by cysts.

Three months later the patient was again admitted to the hospital with complaints of fatigue and progressive weakness. At operation it was found that the pseudomyxomatous nodules assumed the character of a neoplasm. It was impossible to remove all of the tumor formations. The histological examination showed fibrous bands and cavities lined with cylindrical, partially calcified epithelium. Eleven months later a small, hard, painless tumor was found in the left axilla. Histological examination of this tumor established the diagnosis of metastasis of a mucoid adenocarcinoma.

Eleven months after the last operation the patient was found in a stage of cachexia, with a markedly enlarged abdomen. Roentgenograms showed metastases in the lungs.

The author concludes from his observation that pseudomyxoma of the peritoneum should be considered as a cancer originating from cylindrical epithelium. Such formations may develop from a pseudomucinous tumor of the ovary, intestinal diverticulum, or mucoid disease of the appendix.

JOSEPH K. NARAT, M.D.

GASTROINTESTINAL TRACT

Allen, A. W., and Welch, C. E.: Subtotal Gastrectomy for Duodenal Ulcer. *Ann. Surg.*, 1946, 124: 688.

This study is a critical analysis of subtotal gastrectomy for duodenal ulcer performed on 195 patients. The series includes follow-up studies in 136 cases. The three main indications mentioned are cicatricial stenosis, massive hemorrhage, and intractable pain.

In discussing cicatricial stenosis, the authors point out that many ulcer patients become temporarily obstructed during acute exacerbations. However, these have a more sudden onset of symptoms and enter the hospital in a good state of nutrition. Such patients always respond to gastric drainage and intravenous therapy within a week or 10 days. Gastric resection is performed for the cicatricial type of stenosis rather than gastroenterostomy or pyloroplasty even in elderly patients.

In patients beyond the fifth decade, an actively bleeding ulcer does not respond to conservative therapy in one-third of the cases. The younger patients nearly always recover regardless of treatment, whereas a large percentage of the older patients continue to succumb unless subjected to operation early during their bleeding period.

Intractable pain is an indication for surgery in many patients who, if they were in a better economic or intellectual status, might well have continued on conservative measures. However, there are many intelligent patients who will fall into this category.

Technically, the patients who are to undergo gastrectomy are divided into four main groups by the authors. Group I includes the cases in which part or all of the ulcer scar was used in the closure of the duodenum. There were 139 cases in this group with a mortality of 5.1 per cent. Four of the 7 deaths were due to late massive hemorrhage.

Group II included the cases in which the ulcer was far enough distal to the pylorus to allow a transection of the duodenum above the ulcer and leave room for an adequate closure. In these cases removal of the ulcer might have led to disturbance of the bile ducts. There were only 18 patients in this group with 2 deaths, a mortality of 11.1 per cent.

In the 27 patients in Group III, the authors performed transection of the antrum proximal to the pylorus with excision of the mucosa from this segment, in addition to a generous gastric resection. There were 2 poor results in this group. This procedure has lost favor even in the eyes of Finsterer, who suggested the operation originally.

In Group IV there were only 3 patients. It included those patients operated upon in two stages as advocated by McKittrick. The two-stage operation has all the disadvantages of any graded surgical procedure. The authors believe that this plan should be more widely adopted, since the 6-week interval between the two stages gives the inflammatory reaction about the ulcer a chance to heal. At the first stage prepyloric gastrectomy with anastomosis is done; the duodenal stump is dealt with at the second stage.

Transverse incisions were used in patients having a flaring costal angle and in those with low lying stomachs. There were 24 nonfatal complications, 6 of which were bland thrombi with pulmonary embolism. In 5 cases there was stomal obstruction, and in 3, atelectasis.

Persistent gastrointestinal symptoms of some degree will occur in about one-third of the cases. The most frequent residual symptom is the inability to eat a full meal and discomfort, gas, or nausea after eating. Less common but more troublesome are the symptoms of the "dumping stomach." Such patients have a sense of exhaustion or weakness after meals and occasionally have a rapid pulse, perspiration, or vertigo, followed by diarrhea or lower abdominal cramps. These symptoms are often alleviated by dietary measures and can be benefited by a high-protein, low-fat diet. A considerable number of patients gain weight, whereas a larger percentage have difficulty acquiring their normal weight and cannot eat enough to gain while carrying on their work. The average weight loss is nearly twice as high in women as it is in men. Patients who have been operated upon for obstructions lose the least weight, whereas those in which resection was done for pain or bleeding lose the most. It is interesting to note that postoperative results are better in women than in men.

The authors are convinced that posterior short loop anastomosis is preferable to antecolic anastomosis. It has been shown experimentally that each additional few centimeters of the small intestine proximal to the anastomosis add to the incidence of anastomotic ulcer. There were only 3 anastomotic ulcers in the followed-up series.

In the discussion Dragstedt stated that the authors' results bear out his contention that removal of so important a digestive organ as the stomach has a profound effect on the nutritive status of the patient, and he believes that eventually resection of the vagus nerves will supplant gastric resection in most instances of ulcer with intractable pain.

HAROLD LAUFMAN, M.D.

Hellmer, H.: Concerning the Diminution in Size of the Niche in Cancer of the Ventricle. A Difficulty in the Differential Diagnosis between Carcinoma and Ulcer of the Ventricle. (Ueber die Groessenabnahme der Nische bei Carcinoma ventriculi). *Acta radiol.*, Stockh., 1946, 27: 153.

The differential diagnosis between juxtapyloric cancer and ulcer often cannot be made in a single roentgen examination. The size of the niche is not a valid basis for distinction since an ulcer may have a large crater and a cancer a small one. Unless the clinician is to operate on all gastric ulcers, a trial of medical therapy is indicated with subsequent x-ray follow-up. Generally a diminution in size of the crater with medical treatment is thought to rule out cancer and justify the continuation of a conservative regimen. However, the author gives an account of 4 cases in which a definite diminution in size of the niche was observed, but at operation all of the lesions were proved to be cancer. In 3 cases there was a disappearance of the subjective symptoms along with the diminution in size of the crater.

In Europe it has not been emphasized that shrinkage in the size of an ulcer crater does not rule out cancer. The author cites numerous American writers who have pointed out that the niche in gastric carcinoma may become smaller on a medical regimen. A number of artefacts are discussed which might make a crater seem smaller in one examination than in a previous one. True decrease in size may also occur in gastric malignancy. If the lesion is an ulcer which has undergone malignant degeneration in one portion, medical treatment can still cause healing of the nonmalignant portion. If an ulceration of a primary cancer is involved, decrease in size may occur by growth of the cancer tissue into the crater, by generalized contraction of the stomach in scirrhous cancer, or because the crater is a true peptic ulcer developing in a carcinoma and responds like any other ulcer to medical therapy.

The author concludes that a roentgen diagnosis of benign ulcer in the ventricle requires complete disappearance of the niche, with nothing remaining in the place to suggest carcinomatous infiltration.

THEODORE B. MASSELL, M.D.

Zinninger, M. M.: The Surgical Treatment of Bleeding Peptic Ulcer. *Surg. Clin. N. America*, 1946, 26: 1140.

The management of severe hemorrhage from peptic ulcer is difficult to standardize. It is generally agreed that a patient who has had severe recurrent hemorrhage should be treated by operation during an interval after bleeding has ceased and the effects of blood loss have been corrected. However, many patients bleed to death during a hemorrhagic episode. If one could determine early which patients would respond to conservative therapy and which would continue to bleed, one could operate on those in the latter group early in the course of bleeding and reduce the number of deaths from hemorrhage.

When a patient vomits blood and presents the symptoms and signs of bleeding into the upper gastrointestinal tract one must consider the likelihood of ulcer and attempt to elicit a history suggestive of this lesion. Other conditions which may simulate bleeding ulcer are esophageal varices secondary to hepatic cirrhosis or portal hypertension, diffuse gastritis, bleeding tumor, hemorrhagic disease, and aneurysm with erosion into the esophagus or duodenum.

The following studies are helpful in establishing the diagnosis: routine blood studies, determination of the prothrombin time and blood urea nitrogen, fluoroscopy for evidence of aneurysm, attempts to demonstrate esophageal varices by the Valsalva technique, and roentgenological study of the stomach and duodenum with barium by the Hampton technique.

If the presence of peptic ulcer is established the advisability of early surgery must be considered. If bleeding is moderate and appears to cease promptly, the patient should be managed by nonoperative measures.

If the bleeding is massive, continuous, or recurrent, and particularly if the patient is past 60 years of age, operation should be performed after adequate blood replacement therapy. The progress of bleeding may be estimated by clinical examination and by frequent blood pressure, red cell, hemoglobin, and hematocrit determinations. Digestion of blood in the gastrointestinal tract produces an elevation of the blood urea nitrogen and affords an excellent guide to the amount of blood loss and to the continuation or recurrence of hemorrhage.

The author's plan for the management of patients with bleeding peptic ulcer is described in detail. Usually these patients may be placed in one of the following groups:

1. Patients with known chronic peptic ulcer who bleed seriously while under treatment. These should be operated upon promptly.

2. Patients with duodenal ulcer who have been operated upon previously. These will usually bleed from a gastrojejunal ulcer and will usually respond to nonoperative treatment. If bleeding persists operation may become necessary and may be quite complicated and difficult.

3. Patients in whom the source of bleeding cannot be definitely established. These will require thorough study and much caution in the selection of therapy.

4. Patients with perforation, obstruction, or other complications in addition to hemorrhage. These require prompt operation.

5. Patients in any of the groups given who suffer repeated severe hemorrhages. These may require surgical treatment unless one can definitely establish that the bleeding is due to some condition other than ulcer.

The type of operative procedure must be selected for each case. The patient is brought to the operating room while receiving a transfusion. A tube is placed in the stomach and anesthesia is induced by intratracheal administration of cyclopropane and oxygen, with or without ether. A transverse upper abdominal incision is preferred. Excision of the ulcer with partial gastrectomy is the method of choice, but the condition of the patient may not permit a procedure of this magnitude. Ligation of the vessels from outside the stomach may control bleeding from a gastric ulcer, but a duodenal ulcer will require duodenotomy with transfixion suture of the ulcer bed around the bleeding site, followed by closure of the duodenum or by resection. Bleeding from a diverticulum or neoplasm usually requires resection of the offending lesion.

Four brief case reports illustrate some of the more difficult problems encountered in the management of these patients with bleeding peptic ulcer.

EDWARD W. GIBBS, M.D.

Escudero, P., Mosto, D., and Landabure, P.: Whipple's Intestinal Lipodystrophy (Lipodistrofia intestinal de Whipple). *Arch. Soc. argent. anat.*, 1945, 7:139.

Whipple described the first case of intestinal lipodystrophy in a man of 36 in 1907. In all, 13 cases have been published up to this time, a detailed history of the last one being given in this article. A table is given showing the outstanding features of each case, and the cell findings in the skin and organs are described in detail and illustrated with photomicrographs.

The case described here was in a man of 27 years who had a history of generalized polyarthritis since he was 19 years of age. The most important digestive symptoms were distention of the abdomen, a feeling of heaviness after meals, and fatty diarrhea. He also had fever, asthenia, and loss of weight. There was moderate anemia, low blood pressure, and absence of hydrochloric acid in the stomach contents. Histological examination showed increased intestinal villi containing fatty cells, lipomatosis of the glands of the mediastinum and peritoneum, and an increase of the adipopexic cells in the lungs. There was exocrine atrophy of the pancreas with persistence of the islands of Langerhans which were small and contained few alpha cells. There was atrophy of the epidermis and edema of the dermis; the subcutaneous fatty tissue was atrophied. The fats which persisted were more sudanophil than normal and had reverted to the embryonic type. There were foci of embolic glomerulonephritis. There were intense sclerosis and colloid cysts of the hypophysis. There were congestion, septic foci, and Gandy-Gamna nodules in the spleen. These are nodules containing iron from the breaking down of the red blood cells. All cases have ended in death.

The various theories as to the causation of this condition are discussed without arriving at any definite conclusion. The disturbance of fat metabolism is probably an increased excretion, possibly due to lack of vitamin A, which has been shown to be insufficient, but it remains to be shown whether the changes are primary or secondary to the cachexia. The authors are inclined to believe that they are primary.

AUDREY G. MORGAN, M.D.

Roettig, L. C., Glasser, B. F., and Barney, C. O.: Definitive Surgery of the Large Intestine following War Wounds. *Ann. Surg.*, 1946, 124: 755.

The material upon which the authors' study is based consists of 96 consecutive cases admitted to the Septic Surgery Section, Rhoads General Hospital, Utica, New York. The patients were soldiers who had been wounded in overseas theaters of operation, in whom some type of reparative surgery was necessary after overseas definitive surgery of the large intestine. One of the important problems in the management of these cases was that of determining the optimum time to institute reparative surgery. The solution varied with each individual case and depended greatly upon the number, extent, and ur-

gency of the procedures contemplated. As a rule, major surgery was withheld until all clinical and laboratory evidence of malnutrition had disappeared. Whenever possible, the patient was carefully managed until he had regained all but 10 pounds of his former body weight. Many of the patients had multiple wounds of varying severity.

The most important problem of reparative surgery of the large bowel was closure of the colostomy. In the present series, 86 colostomies were repaired. In 6 instances it was necessary to construct a second colostomy proximal to a former colostomy, or to a traumatic colostomy in which it was desirable to completely divert the fecal stream for defunctionalization of this portion of the colon. When definite indications for secondary colostomy are present, it is the opinion of the authors that it should be performed unhesitatingly on the basis of obviating additional surgery and added morbidity, and of improving the end-results.

A total of 14 persistent fecal fistulas were encountered, 7 of which were the result of unsuccessful attempts at closure of the colostomy overseas by the extraperitoneal method. The others were the result of surgical and traumatic cecostomies, traumatic colostomies, and rectal perforations. It is desirable to perform a cecostomy preparatory to the repair of a fecal fistula in the transverse or descending colon.

Penetrating wounds of the rectum which had been produced by a missile perforating the sacrum, or the sacrum and coccyx, were present in 9 patients, in 2 of whom healing occurred spontaneously following a proximal colostomy which completely diverted the fecal stream. Perforated capsules of sulfaguanidine (1 gm. three times a day) were inserted into the distal loop. The distal loop was irrigated with a 1 to 10,000 solution of acriflavine, using 500 c.c. three times a day. Externally, wet dressings of penicillin were applied. However, in 7 patients the colostomy did not close spontaneously under this management. Most of these patients developed an osteomyelitis of the sacrum or coccyx. Closure of the fistula occurred only after removal of the infected bone. There was a marked tendency to eversion and proliferation of the rectal mucosa in front of the sacrum and along the sinus tract. The authors state that 3 important steps are required for successful surgical closure of trans-sacral rectal defects. The first step is excision of the coccyx and of as much of the sacrum as is safely permissible and necessary to allow adequate exposure. Secondly, it is important to achieve as much mobilization of the rectum as possible, both laterally and in front of the sacrum. Finally, it is important to interpose some fat or muscle tissue between the portion of rectum containing the transverse closure and the sacrum before closing the skin. The wound is then closed tightly without drainage.

The cardinal points in the management of rectovesicocutaneous fistulas were a completely defunctioning proximal colostomy and a satisfactory suprapubic cystotomy in conjunction with an indwelling urethral catheter. If these two operative procedures were carried out promptly and satisfactorily, the communication between the rectum and bladder usually healed spontaneously, as did the communication between the bladder and abdominal wall.

For the most part retained abdominal or pelvic foreign bodies found in conjunction with large bowel wounds were asymptomatic. No attempt was made to remove these. Removal became necessary only when they were responsible for persistent sinus leading to the colon, or pericecal, colonic, or rectal abscess or phlegmon.

Extensive laceration of the anal sphincter was encountered in 7 cases. The repair of these required multiple operations. Despite extensive loss of sphincter substance, it was possible to restore satisfactory function in all cases after a defunctioning colostomy had diverted the fecal stream. After plastic repair, several weeks of dilatation and sphincter control exercises were instituted; then a second operation was performed in which the severed ends of the sphincter were united. When more than one interruption of the sphincter was present, one transection was repaired at a time. Daily sphincter control exercises and daily dilatation are believed to be very important in the management of these cases.

Preoperative preparation with sulfaguanidine was an important factor in the success of colostomy closure. The distal loop was irrigated three times daily, and sulfaguanidine was inserted into the distal loop in perforated capsules. Vitamin K was administered.

Closure of colostomy for the most part was performed as an intraperitoneal procedure similar to an end-to-end anastomosis.

The most significant postoperative feature, according to the authors, was oral starvation except for small amounts of liquids and sulfadiazine. The daily caloric, fluid, and vitamin requirements were met by intravenous therapy, and parenteral amino acids were given to provide 30 grams of protein daily. By the second postoperative day practically all patients passed flatus per rectum. Beginning on the fifth or sixth postoperative day, the oral intake was gradually increased until a full diet was reached by the twenty-fourth postoperative day. In all, a total of 108 large bowel operations were performed with no fatalities. Three patients developed fecal fistulas, and of these, only 1 patient required surgical correction. Nine patients showed wound infection, while 4 patients developed a ventral hernia at the site of closure.

The eminently successful results with intraperitoneal closure obtained by the authors recommends it as a procedure to be followed in civilian surgery.

HAROLD LAUFMAN, M.D.

Morton, J. J., Jr.: Diverticulitis of the Colon. *Ann. Surg.*, 1946, 124: 725.

The author's classification of diverticulitis is as follows:

1. Diverticulosis.
2. Diverticulitis with spasm.

3. Diverticulitis with complications: (a) perforation; (b) sinus and fistula; (c) obstruction; (d) complicating or masking other disease.

Diverticulitis with spasm rarely occurs in patients under 40 years of age. The typical history reveals a middle-aged, or older, corpulent individual who has been habitually sedentary and constipated and who is suddenly seized with cramplike pain in the lower abdomen, accompanied by increasing constipation. The condition is often ushered in by the passage of several loose stools. Signs of inflammation follow, according to the degree of involvement.

Of 111 patients, 94 had pain as a predominant symptom, usually in the lower abdomen and on the left side. Constipation was present in 45 patients, diarrhea in 37, distention in 32, fever in 29, and vomiting in 28 patients. Blood in the stools was present in 24 patients. Diverticulitis with spasm is a self-limited disease, according to the author, and should subside or improve in a period of from 3 or 4 days to a week under good medical care.

In 39 patients with diverticulitis there was perforation. In 3, there was perforation into the free peritoneal cavity with extensive peritonitis; 2 of these patients recovered. Of 36 patients with localized abscess subjected to drainage, 24 recovered and 12 died in the hospital. Of the 36 patients with localized abscess, 18 had fistula formation, or obstructions. These patients were very ill from the start and improved appreciably with rest and therapy. Barium showed extravasation of fluid outside the bowel lumen on three occasions, and free air in the peritoneal cavity was twice observed. In 3 instances the abscess had perforated into the extraperitoneal rectal space and extended into the soft tissues so that it simulated an extravasation of urine with swelling and crepitation under the skin in the region of the scrotum and penis.

Twenty-two patients had known fistulas. In 11, openings were present from the sigmoid to the skin: in 8, from the sigmoid to the urinary bladder; in 2, from the sigmoid to the urethra; in 2 from the sigmoid to the small intestine; in 1 patient from the sigmoid to the cecum; in 1, from the sigmoid to the rectum; in 4 patients, from the sigmoid to the vagina; in 1, there was a sinus to the retroperitoneal tissues; in 1, an ischiorectal sinus; and in 1, a sinus into the mesocolon. Most of the complaints of these patients were of leaking fistulous openings, or of symptoms referable to the organ involved, but there were no signs of severe infection.

Obstruction to the bowel was found in 34 patients. In 18 of these there was partial obstruction at the sigmoid area, while in 13 there was complete obstruction in the same region. Obstruction may result from scarring and thickening or from adhesions. In 3 patients there was obstruction of the small intestine adherent to the inflammatory mass.

Often, the diagnosis of diverticulitis from carcinoma is practically impossible. Even when the surgeon has the lesion in his hand, he cannot be sure whether it is a chronic inflammation or a neoplasm. In women, diagnostic difficulties often confront the gynecologist; the left tube and ovary frequently become attached to the inflamed sigmoid, and a diagnosis of solid tumor of the ovary may be made. Such errors can be obviated by careful studies with barium enema. Another pitfall for the gynecologist is the fecal fistula resulting after drainage of a pelvic abscess. Extravasation of urine has been considered in some cases as a differential diagnosis. Frequently, associated infection of the genitourinary tract is noted. Pyelitis, pyelonephritis, or cystitis may clear up after diverticulitis has been eliminated. The roentgenologist also is often times confounded by the differential diagnosis between diverticulitis with obstruction, and cancer. Aids in fluoroscopic diagnosis are such features as nonfixation of the lesion, tenderness of the bowel, and distensibility.

The author offers no new suggestions for treatment, but advocates the Devine colostomy in the right transverse colon for the purpose of defunctioning the colon in the treatment of fistulas to the skin or bladder. HAROLD LAUFMAN, M.D.

Cave, H. W.: Late Results in the Treatment of Ulcerative Colitis. *Ann. Surg.*, 1946, 124: 716.

This article deals mainly with the evaluation of late results as a guide to the advisability of continuing radical surgery in the treatment of ulcerative colitis. Of a total of 101 patients operated upon, 50 of the 80 surviving patients were personally interviewed by the author. The length of time which had elapsed since operation varied from 10 years to 1 year.

In the author's opinion, the fact that 95 per cent of those individuals who underwent radical surgical management have gained considerable weight, are relieved of annoying, bloody diarrhea, and are afebrile, is significant and encouraging. The average weight gain for these 50 patients is 45 pounds. Some patients gained as much as 120 pounds following the removal of their colons. One patient gained only 16 pounds. In 2 patients it was possible to take down the ileostomy successfully and restore the fecal stream by ileosigmoidostomy.

Ileostomy revision for prolapse had to be carried out to relieve obstruction or to prevent gangrene of the protruding intestine in 11 patients. Of these, 5 came to revision on account of obstruction. Aside from prolapse of the ileostomy, the greatest problem in these patients is that of the prevention of irritation of the skin around the ileal stoma. The author believes that the best and most satisfactory treatment of the skin is the application of a dry dusting powder of Fuller's earth (kaolin). The skin should be bathed once or twice daily with soap and warm water, and the powder or kaolin freely applied.

Acute or intermittent ileus due to adhesions or volvulus at or near the ileostomy opening brought 4 patients to surgery. A volvulus about the ileum was present in 2, and in 1 patient the ileostomy had to be moved from the right to the left lower quadrant due to two episodes of obstruction from volvulus.

There were striking instances of repeated collapse from sudden salt deprivation due to unexplainable abrupt and profuse diarrhea through the ileal stoma in 3 patients. Once such an attack has occurred, patients learn to recognize the prodromal symptoms and can allay an attack with salt tablets or intravenous saline. All patients are encouraged to use an abundant amount of salt in their food in order to maintain a high sodium chloride blood level.

Primary ileosigmoidostomy, leaving the colon intact, was performed in 11 cases. One of these patients progressed satisfactorily for a period of 5 years, until she began to have a series of severe symptoms, including diarrhea with blood, pus, and mucus, and rapid loss of weight. Roentgenograms revealed ulceration of the distal 18 inches of ileum, and resection had to be performed.

In 4 of the younger female patients pregnancy occurred, and therapeutic abortions were carried out for fear of disturbance in the ileal stoma.

Practically all patients who have been colectomized after ileostomy but who have retained their rectal pouch have a fair amount of discharge through the anal opening two or three times a day. When the discharge is annoying and malodorous, a rectal lavage biweekly has proved helpful.

Careful interrogation into the diet habits of these patients in an attempt to arrive at a standard diet led to no agreement among the patients. Many of them eat practically everything, while some avoid certain specific foods which they claim do not agree with them. Of the 50 patients, 40 are at work, ranging from manual labor to white collar jobs. Many of the younger patients are able to play golf, baseball, and tennis. A few even swim in the ocean.

In the group of 101 patients there were 3 who showed malignant changes originating in a polyp in some part of the colon. These 3 patients are still alive—one, 7 years, one, 5 years, and the other 3 years after colectomy.

Frequently, following the removal of the rectum as the third and final stage in the surgical treatment of this disease, the ileostomy takes on, in some degree, the functions of the rectum. The ileal contents become more solid, the lumen appears to enlarge, and the walls thicken. HAROLD LAUFMAN, M.D.

Ehrenpreis, T.: Megacolon in the Newborn. *Acta chir. scand.*, 1946, 94: Supp. 112.

Since Hirschsprung's demonstration, in 1886, of the disease with which his name is synonymous, congenital megacolon has been considered by many investigators, none of whom have satisfactorily elucidated the primary etiology of the condition. Three distinct trends as to the pathogenicity of megacolon have been held: (1) the malformation theory (of Hirschsprung) assumes a congenital anatomical dilation and hypertrophy of the colon to be present; (2) the obstruction theory contends that the dilatation arises from mechanical obstruction to passage as the result of an abnormally redundant sigmoid which predisposes to valve action, kinks, or volvulus; and (3) the neurogenic theory which indicts an overly active sympathetic nervous system (or decreased parasympathetic activity) as the causal factor. This last has been held tenable owing to the beneficial results obtained from sympathectomy, although experimental evidence is inconclusive.

Working at the Kronprinsessan Lovisas Children's Hospital, in Stockholm, the author has intensively studied 10 cases of disease of the megacolon beginning at birth. The infants were subjected, during the first 10 days, to clinical and x-ray examination, and were subsequently followed. One hundred normal infants were similarly examined for purposes of comparison. The studies revealed fairly uniform clinical courses and roentgenograms showed the condition to be of early development. Symptoms of obstipation, abdominal distention, and vomiting appeared within 7 days after birth. Scout films and contrast enemas showed gaseous distention of the bowel, a marked retention of the enema, and almost no contractile activity of the large bowel in comparison to the normal. The size of the colon was seen to be within normal limits although slightly larger than the average for normal infants. Redundancy of the sigmoid was no greater than in the normal newborn infant in whom such a state was found to be a normal, constant, physiological phenomenon. No mechanical obstruction was present in any of the cases. Over a period varying from 18 days to 3½ months there was a transition from essentially normal bowel measurements to the typical megacolon picture. A deficiency in the contractile and evacuation power of the colon was evident from the onset.

Megacolon in the beginning consists primarily of an ileuslike state which is identical in appearance to simple meconium retention or to bowel obstruction resulting from atresia or stenosis. From the latter it may be distinguished by contrast enema, and from the former by the clinical course in that meconium retention is relieved by evacuation of the bowel, whereas the obstipation of megacolon persists over a period of weeks to months until the typical picture of dilation of the colon with a froglike belly is developed.

The author concludes that the theories regarding malformation and obstruction of megacolon are highly questionable. A sympathetic hyperfunction appears to be involved in the cause of megacolon, but the nature of the disturbance has not been determined. He therefore defines megacolon disease as a dysfunction of the evacuation of the colon, of an as yet unknown origin, occurring in the absence of morphological or mechanical causations, and giving rise secondarily to a characteristic dilatation of the colon. WAYNE CAMERON, M.D.

Casco, C. M.: A New Technique for Temporary Cecostomy (Nueva tecnica para el ano cecal temporario). *Rev. As. méd. argent.*, 1946, 60: 3.

The author describes a technique for a hermetic cecostomy whereby the taenia of the cecum is infiltrated with some inert fluid such as water or pro-

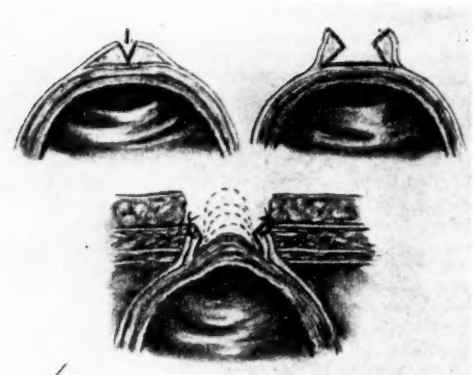


Fig. 1 (Casco)

caine in order to form a sizable bleb, 6 by 4 cm. The dome of the bleb is then incised and the resultant flaps are sutured to the aponeurosis of the external oblique muscle after iodine is applied to the peritoneal opening and the flaps.

The iodine produces a thick fibrin effusion which insures attachment and seals against subsequent leakage (Fig. 1). The protruding muscularis portion is now pulled upward and a pursestring suture which anchors a Paul tube *in situ* is applied.

The same technique is applicable to colostomies which may be made by utilization of the transverse colon. STEPHEN A. ZIEMAN, M.D.

Joffe, H. H., and Wells, A.H.: Normal Appendices in 1,000 Appendectomies. *Minnesota M.*, 1946, 29: 1019.

In a review of 1,000 consecutive appendectomies performed by 37 surgeons it was noted that 275 of the appendices removed showed no pathological condition or only obliteration of the lumen without any active inflammatory process.

A study of this group of case records disclosed that a small group of surgeons was responsible for a relatively high percentage of the diagnostic errors. In spite of the pathologist's report of normal appendix, the final clinical diagnosis of the case records was seldom found to be corrected from the original working diagnosis.

The records of the clinical manifestations were quite inadequate for an intelligent summarization, but it was apparent that obvious signs of disease outside of the appendix were often disregarded.

The authors estimate that normal appendices should constitute not more than from 15 to 20 per cent of the appendices removed where good surgical practice is carried out. EDWARD W. GIBBS, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Brunschwig, A., and Morton, D. R.: Resection of Abdominal Carcinomas Involving the Liver and Spleen Secondarily. *Ann. Surg.*, 1946, 124: 746.

The purpose of this communication is to summarize the experiences gained in a limited series of patients who at celiotomy presented carcinoma primary in an abdominal viscus with direct spread to the liver or with metastases in the liver or spleen, and in whom the primary growths were excised en masse with the spread into the liver; or those in whom the primary growths were excised as well as hepatic or splenic metastases, at the same sitting.

In 10 patients with primary malignant neoplasms in various abdominal viscera and with direct spread of one or a few metastases into the liver or spleen the primary growths were excised en masse with the direct extensions in the liver or with resection of the discrete metastases that were visible. The immediate surgical mortality was 10 per cent (1 patient).

The best results were observed when the neoplasms had spread to the liver and discrete metastases were not present. It is suggested that increased palliation might have been achieved in some instances in which metastases were excised, but sufficient time has not elapsed for more definite confirmation of this impression.

JOHN J. MALONEY, M.D.

Savagnone, L. and Citarda, A.: Clinical Contribution to the Study of the Relationship between Biliary Stasis and Hepatic Lesions (Cintributo clinico allo studio dei rapporti fra stasi biliare e lesioni epatiche). *Policlinico*, sez. med., 1946, 55: 3.

Two cases are presented in which different etiological factors contributed to a similar clinical picture of severe hepatic insufficiency on a basis of biliary stasis. In the first case, a chronic inflammation of the pancreas with subsequent appearance of an adenoma in the cephalic portion gave rise to abundant adhesions around the duodenum, gall bladder, and bile ducts; and the development of a painless, intense jaundice; a variable, low grade hyperpyrexia; and the laboratory findings of an obstructive jaundice. In the second case a primary carcinoma of the gall bladder had given rise to metastases to the liver and lungs. In both cases signs of hepatic insufficiency had been superimposed upon those of an extrahepatic obstructive lesion, and ascites formation had led to death in from 6 to 12 months. Autopsy showed a profound disturbance of the lobular architecture and extensive proliferation of connective tissue elements in the first case; in the second case there

was evidence of interstitial hepatitis combined with metastatic nodules.

These cases are offered as evidence that obstruction and biliary stasis, even on different bases, can produce a similar clinical picture.

EDITH B. FARNSWORTH, M.D.

Mahoney, E. B.: Cholecystoduodenocolic Membranes. *Surgery*, 1946, 20: 704.

One of the most common anatomic peritoneal variations is the cholecystoduodenocolic fold which is essentially an extension of the normal hepatoduodenal ligament to include the gall bladder, second portion of the duodenum, and the hepatic flexure of the colon. Mahoney attempted to evaluate the clinical importance of this congenital peritoneal anomaly which occurs in 18 per cent or more of patients but causes symptoms in a very few individuals.

In the past there has been considerable controversy about the etiology of these peritoneal bands. Some investigators thought them to be the result of localized peritonitis which may have started in fetal life, while other observers believed that they were the result of excessive abnormal development of normal peritoneal folds. Harvey, in 1918, after an exhaustive study concluded that these membranes often developed in fetal life as a result of abnormal growth, and that the congenital type could definitely be differentiated from that resulting from inflammatory processes in the upper abdomen.

The congenital peritoneal attachments are most frequently seen about the gall bladder. At the Strong Memorial and Rochester Municipal Hospitals (Rochester, New York) only 18 cases have been found in which the upper abdominal symptoms have been considered to be due to congenital attachments.

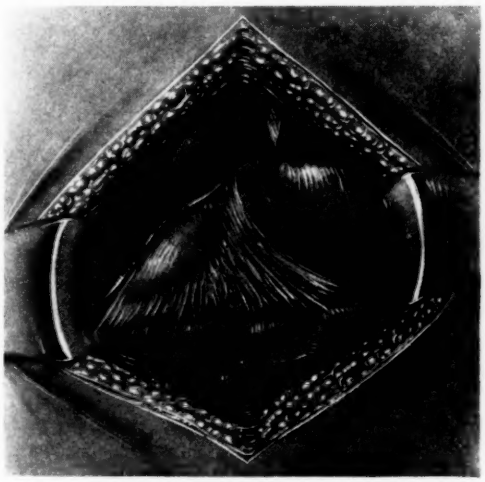


Fig. 1 (Mahoney). Appearence of cholecystoduodenocolic membrane on opening the abdomen.

Fig. 2 (Mahoney). Cholecystoduodenocolic membrane after partial mobilization.

Harris, in 1914, was the first observer in this country to call attention to the role of congenital bands in producing abdominal symptoms. All patients had disturbance of digestion characterized by epigastric distress 2 to 3 hours after eating, which was usually followed by nausea and emesis with subsequent relief of pain. Tenderness in the epigastrium was present and the gastric analysis showed hyperchlorhydria: only 1 of Mahoney's 18 cases had hyperchlorhydria. Homans, in 1916, first emphasized the similarity of symptoms caused by these congenital bands to gall bladder disease and/or duodenal ulcer. Taylor and Kantor have described a typical roentgenographic deformity which consists of a high fixation of the duodenum associated with a dilated ptotic stomach and a sharp angulation between the first and second portions of the duodenum: this was not observed consistently in Mahoney's cases.

Of Mahoney's 18 patients, 6 had symptoms suggestive of cholecystic disease, 7 had ulcerlike symptoms which also suggested partial duodenal obstruction, and 5 had vague upper abdominal symptoms that could be classified neither as ulcerlike or gallbladderlike. A correct preoperative diagnosis of congenital bands was made in 5 cases; in the remainder a diagnosis of chronic cholecystitis was made in 8 cases, of duodenal ulcer in 2, and of tumor of the ampulla of Vater, chronic appendicitis, and questionable carcinoma of the hepatic flexure of the colon in 1 case each.

The operative procedure employed in this series of 18 cases was cholecystectomy and division of the bands in 8 cases, and division of the bands without cholecystectomy in 10 cases. One of the 10 patients also had a Heineke-Mikulicz pyloroplasty because of definite narrowing of the duodenum as a result of the pressure from the band.

The type of congenital bands seen at operation varied considerably. The most commonly encountered type, which incidentally is the most extensive type seen, is illustrated in Figures 1 and 2. It is attached over the entire gall bladder and spreads out to involve the duodenum, the hepatic flexure, and the proximal portion of the transverse colon which may be narrowed by the band.

The operative results were as follows: 13 patients are considered cured, 3 are benefited, and 2 are not benefited. Those patients who had severe pain were benefited by the operation. The patients with equivocal symptoms had equivocal results. The patients who were not cured had no other demonstrable organic cause of complaints. ROBERT TURELL, M.D.

Marble, A., and McKittrick, L. S.: Islet Cell Tumor of the Pancreas with Hyperinsulinism. *N. England J. M.* 1946, 235: 637.

Six cases of islet cell tumor of the pancreas with hyperinsulinism, verified at operation, are reported. In 5 cases, removal of a single adenoma resulted in a relief of symptoms that had persisted from 4 to 7 years before operation. In 1 case, death occurred in 7 weeks after operation. This patient was found to have an islet cell carcinoma, with multiple metastases in the liver.

Of the 5 patients with benign adenoma, 3 were females and 2 were males. The ages of the patients at the time of operation ranged from 16 to 49 years, and the patients were seen in from 2 to 8 years after the onset of symptoms. In 4 cases the tumor occurred in the head of the pancreas, and in 1, in the body of the pancreas. Two of these patients had been operated on previously without the discovery of a tumor.

The patient with carcinoma was a woman 59 years of age at the time of operation, with symptoms of 4 years' duration. In this case the primary tumor was in the tail of the pancreas.

Microscopic examination of tumor tissue from the 5 patients with adenoma showed the capsule of the tumor to be incomplete in each of 4 cases in which there was enough tissue available for satisfactory examination. In 1 case questionable blood vessel invasion was noted.

In the 4 cases in which assays were carried out, the insulin content ranged from 3 to over 100 units per gram of tumor tissue.

The important features in the diagnosis of islet cell tumor are the characteristic symptoms associated with well marked hypoglycemia (blood sugar concentrations usually below 50 mgm. per 100 c.c.) brought on by fasting, increased by physical exertion, and relieved by food. The glucose tolerance test is of aid in diagnosis only if it is carried out for a sufficient length of time—4 to 6 hours—to allow the blood sugar to fall to an abnormally low level.

Because of the danger of damage to the central nervous system by repeated attacks of prolonged hypoglycemia, and because of the possibility of malignant degeneration of a tumor initially benign, early exploratory operation is urged in patients in whom the diagnosis of islet cell tumor with hyperinsulinism has been made. CHARLES BARON, M.D.

MISCELLANEOUS

Altemeier, W. A.: The Treatment of Penetrating Wounds of the Abdomen in Civilian Practice. *Surg. Clin. N. America*, 1946, 26: 1152.

The author reports a series of 161 cases of penetrating wounds of the abdomen treated in the Cincinnati General Hospital, Cincinnati, Ohio, from 1942 to 1946. The over-all mortality rate in this series was 14.2 per cent.

Preoperative preparation consisted of the use of morphine, oxygen, shock position, and the intravenous injection of fluids. He believes that whole blood is far superior to plasma or any other solution in the treatment of shock associated with penetrating wounds of the abdomen. If necessary, 2 and even 3 transfusions were carried out at once, at least 1 of which was in an arm vein if bleeding from the vena cava was feared. The systematic administration of 3 gm. of sodium sulfadiazine preoperatively by intravenous injection was routinely carried out.

The operation was performed under a general anesthetic as soon as the general condition of the patient would permit. The arrest of hemorrhage was the first objective. The author stresses the necessity of early suturing of all perforations of the diaphragm in order to minimize pleural contamination and the resultant severe pleural infection. The danger of overlooking tangential wounds at the junction of the mesentery and the small bowel, as well as wounds of the retroperitoneal portions of the colon and duodenum, is emphasized. If resection was necessary, an aseptic end-to-end anastomosis was performed. Large bowel lesions were treated similarly; exteriorization procedures were not carried out. A proximal colostomy was always established in wounds of the rectum. No drainage of the peritoneal cavity was carried out, but the retroperitoneal tissues, if involved, were always drained. Sulfanilamide was not used locally in the peritoneal cavity; the drug was given parenterally both before and after operation. Penicillin was sometimes used in connection with the sulfa drug. The wounds were closed with through-and-through silver or wire sutures.

The causes of death were: hemorrhage in 7 cases, pneumonia in 4 cases, empyema in 4 cases, and peritonitis in only 2 cases (8 per cent of the deaths). By contrast, in a series of 104 cases compiled before the advent of chemotherapy, peritonitis was the cause of death in 9 cases (31 per cent of the deaths)

F. J. LESEMANN, JR., M.D.

Bogle, J. H.: War Wounds of the Abdomen. A Review of 131 Cases. *Am. J. Surg.*, 1946, 72: 656.

Of the 131 patients with gunshot wounds of the abdomen upon whom Bogle operated, 28 died, a mortality rate of 21.3 per cent.

Preoperative care consisted in careful inspection of the patient, making him dry and warm, noting the emergency medical tag for what previous treatment had been ordered, appraisal of the patient's wounds, catheterization to rule out injury to the urinary tract, and checking of the patient's blood pressure and pulse in order to determine the imminence of shock. Shock treatment was undertaken by a shock team which administered whole blood in amounts up to 5,000 and 6,000 c.c. At the same time, sulfadiazine and penicillin therapy was begun. A Levine tube was inserted into the stomach and Wangensteen suction applied.

As soon as the patient's condition warranted it, anteroposterior and lateral x-rays were taken. In all abdominal wounds, films were taken of the chest, as well as of the abdomen, and vice versa. The position of the missile or missiles was located and this knowledge, in combination with the position of the wounds, gave the surgeon a fairly accurate idea of the path the missile had taken and the organs that were probably injured. It also frequently settled the question of whether or not a thoracoabdominal wound was present.

In the operative treatment, gas-oxygen-ether was used in all abdominal cases and was given by the closed system. In cases in which the chest was also involved, intratracheal anesthesia was always used, and it was also used in many of the purely abdominal cases as well.

Wounds of the back were usually débrided first so that the patient would not have to be turned for this purpose at the end of a long operation. By the same token, if the patient was in poor condition after an abdominal operation and it was judged he would not stand further procedures on other multiple injuries, such as compound fractures of the extremities, these were put in traction or plaster splints and débrided at a later date.

If a thoracoabdominal wound was present and thoracotomy was necessary, this was usually done first and the laparotomy second if the necessary procedures could not be done through the thoracotomy incision.

The type of incision used was based on the position of the wounds and the findings of the roentgen examination.

After sucking and mopping out of the peritoneal cavity, active bleeding was looked for. Then the small intestine was inspected in its entirety and all perforations tagged with clamps. The small intestine was then eviscerated while the other organs within the peritoneal cavity were inspected. This is an important time-saving procedure and here again an adequate incision is necessary or the small gut will become markedly congested while it is being held outside.

Injuries of the large bowel may be very deceptive and hard to find, and it is absolutely imperative that the operator be sure whether or not there are any perforations in it.

When a penetrating wound of the anterior wall of the stomach is present, the gastrocolic omentum should be incised and the posterior wall inspected. If there is still doubt, an anterior gastrotomy may be done and the missile searched for within the lumen of the stomach.

Injuries of the colon were treated by means of exteriorization in nearly all cases. Small intestinal injuries were repaired if at all possible. If this was not possible, resection and usually end-to-end primary anastomosis were done.

Injuries of the infraperitoneal and retroperitoneal portions of the rectum are very serious. The diagnosis may be made by digital examination, proctoscopy, or deduced from the course of the missile.

Wounds of the liver had usually stopped bleeding when the abdomen was opened. If bleeding was present, it might be necessary to pack the liver.

Lacerations of the duodenum are difficult to repair and are usually associated with other grave injuries. The duodenum must be mobilized adequately to get at least a 2 layer closure, and preferably a 3 layer one.

Lacerations of the gall bladder were treated by cholecystectomy as there were other injuries to be cared for, and this procedure was simpler and quicker.

Extreme conservatism was used in treating wounds of the kidney. Nephrectomy was done only when the kidney was grossly fragmented or there was continued bleeding from the renal vessels. Extraperitoneal drainage to the kidney area was provided through a flank incision.

Bladder wounds were treated by doing a suprapubic cystostomy and suturing the lacerations.

At the close of abdominal operations when there had been intestinal injuries with contamination, 5 gm. of sulfanilamide, mixed with 100,000 units of penicillin powder, were dusted into the peritoneal cavity and the layers of the abdominal wall. No intraperitoneal drainage was used except in the presence of liver, pancreatic, and duodenal injuries.

All entrance and exit wounds were thoroughly débrided and loosely packed.

Infection was certainly not a factor in the postoperative course of the great majority of these patients while under observation in field hospitals.

At the end of the operation the patient was sucked out with an intratracheal catheter, if necessary, until dry, and taken to the postoperative ward. He was not moved from the stretcher. The operative procedure had frequently been long and it was necessary to observe the patient closely in the immediate postoperative period. Oxygen was given frequently, usually by nasal catheter. Wangensteen suction was applied. Frequently blood was given. Occasionally, a patient would lapse into secondary

shock. Concentrated serum albumin was found to be useful in this emergency, although it was often not available. Patients with chest wounds were put in a sitting-up position when possible.

Parenteral fluids were given, a minimum of 3,000 c.c. a day (1,000 c.c. of plasma, 1,000 c.c. of physiological saline solution, and 1,000 c.c. of 5 per cent glucose in distilled water) until the patient could take fluids by mouth. Fluids lost by gastric suction were replaced by intravenous saline solution. Whole blood was given when indicated and was very useful for giving a patient a boost several days after the operation.

The time intervals between wound and operation ranged from 2 hours to 4 or 5 days and averaged 9.7 hours.

There were 16 cases in which exploratory laparotomy was performed, and in 1 fatal case no visceral lesion was found, a mortality rate of 6.2 per cent. These operations were done in cases in which the presence of a visceral injury could not be ruled out. In some the peritoneum had been penetrated or perforated without injury to a viscus.

The data compiled from this group of cases indicate that the mortality from abdominal wounds in World War II is not greatly influenced by the time lag between injury and operation as has been the case in the past. This is probably due largely to the control of infection by the present methods of chemotherapy. The severity of the injury, as represented by the extent and multiplicity of the visceral lesions, is the major factor influencing the mortality in this series. The mortality rates here reported are similar to others reported in the recent war and indicate a marked reduction as compared with the mortality rates of previous conflicts.

STEPHEN A. ZIEMAN, M.D.

Jones, H. W., Jr., Falor, W. H., and Burbank, C. B.: Five Hundred and Twenty-Four Abdominal Wounds on the Western Front. *Bull. Johns Hopkins Hosp.*, 1946, 79: 283.

Despite increasingly lethal weapons in World Wars I and II, the mortality in abdominal wounds that reached surgical care has dropped. An analysis of this improvement is important.

Three of 4 casualties that reached definitive surgical care manifested shock as evidenced by the systolic blood pressure. Intravenous blood and plasma were the mainstays in combating shock. At Alamein, it is reported that 16 units of blood and 10 units of plasma per 100 casualties were used. By the time of the Western Front, similar cases received 190 units of blood and 230 units of plasma per 100 casualties. An attempt to standardize the ratio of blood to plasma was made but it was found best to determine the amount of blood needed by the estimated loss, as determined by the hemoglobin and blood count.

Immobilization of the shock cases was rigidly practiced. Clothes were cut off and x-rays taken only after revival, and all unnecessary handling was avoided. To avoid ambulance jostling, definitive surgical care was given as far forward as possible and early postoperative evacuation of abdominal wounds was avoided. Oxygen was used but was of lesser importance. Hot water bottles were helpful only for comfort in the winter months. Surgical procedures were disastrous when long, major operations were tried on casualties that were not out of shock, but were successfully completed in many cases in which the blood pressure fell to shock levels (80 systolic) after the administration of the anesthetic but before beginning the operation.

Preoperative preparation included, after recovery from shock, passage of a Levin tube with suction, urinalysis, anteroposterior and lateral x-rays of the abdomen. Adequate morphine was given by the intravenous route in shock cases, and operation delayed if morphine had been given subcutaneously during shock until recovery from shock provided evaluation of the patient's reaction to the morphine.

Operation, although near the front, was done with adequate facilities. The duration of operation averaged 1½ hours in 114 cases because of the extensiveness of the procedures. Rapid and accurate operating was stressed. More than 90 per cent of the patients were anesthetized with nitrous oxide and ether through an endotracheal tube and the remaining 10 per cent were anesthetized with drop ether or spinal anesthesia.

Seventy-five per cent of the incisions were rectus or pararectus, 20 per cent midline, 3 per cent subcostal or transverse, and 2 per cent miscellaneous. The routine for intra-abdominal exploration was to precede immediately to the small bowel if the liver and spleen were not grossly hemorrhaging, eviscerate the bowel, and examine the area from the ileocecal valve or ligament of Treitz. Perforations were marked with dry gauze and the Allis clamp and then repaired. The stomach, duodenum, liver, and spleen were next examined. The large bowel was examined with the small bowel eviscerated, suspected areas of injury being approached last. Finally, the bladder and kidneys were examined.

The use of sulfanilamide and penicillin in the abdomen was abandoned later in the campaign. The peritoneum was closed with continuous number 0 chromic catgut; interrupted catgut was used in the fascia and silk in the skin. Army directives required stay sutures. Through and through wire with layer closure also gave good results. Of the 524 cases operated upon, 479 presented intra-abdominal trauma and 45 negative findings, with 1 death in the latter group.

Small bowel injury was the most common abdominal lesion (22%). Bleeding from the small bowel or its mesentery was the most common cause of intra-abdominal hemorrhage. The standard method of treatment was repair of the lacerations and when resection was necessary, open end-to-end anastomosis. Ileostomy was never used. The degree of peritoneal contamination in these cases was the most important single factor in the prognosis.

Large bowel injuries were only slightly less common than those of the small bowel. The standard method of treatment was exteriorization without proximal fecal diversion. If it was impossible to exteriorize as in the distal sigmoid, repair was accompanied by proximal colostomy. The colostomy was preferable through a separate incision, but, as in exteriorization of the transverse colon, it could be made through the operative wound. Cecal lesions had twice the mortality of other colon wounds. In the latter cases ileotransverse colostomy with exteriorization of the cecum is preferable.

Retroperitoneal hematoma was the third most common finding at celiotomy. Its chief importance is that the preoperative symptoms and findings are indistinguishable from injury to an abdominal viscus. The source of bleeding in the hematoma should not be explored.

The liver was the third most frequently wounded abdominal viscus. Treatment centers about the arrest of the hemorrhage and drainage to provide for the inevitable leakage of bile from the wounded liver. A dry gauze pack usually accomplished both purposes most effectively.

Stomach wounds were usually repaired with care to explore the posterior surface of the stomach by division of the gastrocolic ligament.

Kidney wounds were relatively minor and transperitoneal nephrectomies were necessary in only 42 kidney wounds. Drainage of the perirenal space was adequate for the remaining cases.

Traumatic evisceration was of greatest concern because of loss of tissue, but most of the cases were closed with the aid of some ingenuity and healed with surprisingly little real trouble.

Bladder wounds were treated by repair and with suprapubic tube and urethral catheter in 16 cases, and by repair and with urethral catheter alone in 12 cases. The latter did well, while the patients with suprapubic tubes often arrived at the rear echelon in poor condition, particularly when a concomitant colostomy existed. It was decided, therefore, in small bladder wounds away from the neck of the bladder that it is best to close them with a double row of catgut with urethral drainage alone. A Penrose drain in the prevesical space can be used for several days.

Rectal wounds require celiotomy to rule out an intra-abdominal wound and to establish proximal colostomy. The perineal wound must be large enough or be enlarged for adequate drainage. In low rectal wounds the rectum and sphincter may be incised from the injury to the outside. There were 8 deaths in 24 cases, this being the highest mortality of any type of injury in spite of the lowest incidence of complicating visceral lesions.

Spleen injuries occurred in 16 cases: 12 required splenectomy and 4, being minor, required no treatment.

Great vessel injuries occurred in 7 cases with a mortality of 86 per cent; 2 deaths occurred on the operating table. Ligation was attempted in each case with the exception of 1 in which an attempted suture of the vena cava was made on its being mistaken for the portal vein.

Gall bladder wounds were treated by the use of a drainage tube (3 cases), cholecystectomy (3 cases), and closure of the laceration (1 case). Laceration of a common duct was closed around a catheter (1 case). Drains were used in all cases.

Ureteral wounds (3) were managed by cutaneous ureterostomy, by anastomosis, and by implantation in the bladder, with complete success only in the last case.

Pancreas injuries (3) were treated only by drainage.

Postoperative care was confined to essentials but adequate and standardized to a large degree, with complete but brief records of the fluid intake and output, penicillin, intravenous sulfadiazine, gastric suction with frequent check and irrigation during the first 5 hours. The daily fluid given was 1,000 c.c. of isotonic saline solution in glucose, 2,000 c.c. of 5 per cent glucose in water, and a unit of plasma.

Shock, uremia, atelectasis with pneumonia, and peritonitis were the four principal causes of death in decreasing incidence in the order named. The 6 hours from wounding to surgery are no longer considered necessarily the golden period for operative treatment but principal stress is placed upon the shock state. Bronchoscopy was important in the prevention and treatment of atelectasis and massive pulmonary collapse. Judgment in using fluid and electrolytes is important if pulmonary and other edema is to be avoided.

FREDERICK C. HOEBEL, M.D.

Crosby, R. C., and Cooney, E. A.: Surgical Treatment of Ascites. *N. England J. M.*, 1946, 235: 581.

The authors present a review of the various surgical methods of treating ascites, with a detailed description of a method employing a glass button inserted into the abdominal wall, which they have used in 7 cases. The authors have added a top plate to the button as used by previous workers, in order to prevent the omentum from becoming impacted in the core of the spool and thus blocking the outflow of ascitic fluid.

One great advantage of this therapeutic device is its ease of application. Patients with hepatic cirrhosis do not tolerate major surgery well. Malnutrition, susceptibility to shock, and tympanites contribute to the high operative mortality. Wound healing is poor unless vitamin C and a great deal of protein are given. The anesthetic tolerance is low, since the damaged liver detoxifies the anesthetic agent poorly; yet large amounts of anesthetic are usually required for satisfactory anesthesia in patients with alcoholic liver cirrhosis. For these reasons other major surgical procedures used in the treatment of ascites are limited in their application.

The insertion of the button is a simple procedure which may be done under local anesthesia, although spinal anesthesia was used in these cases. The site selected may be over either the right or left rectus

muscle below the level of the umbilicus. A 6 cm. midrectus incision is made and deepened through the muscle layer to the peritoneum, which is nicked to allow the insertion of a suction tube to remove the ascitic fluid. The opening in the peritoneum is then enlarged to the same length as the skin incision, and the subcutaneous fat layer is freed over an area of about 10 cm. below the lower margin of the wound. After downward retraction of the skin and fat layer, and upward retraction of the peritoneum and anterior rectus fascia, a stab wound is made about 4 cm. below the lower margin of the wound, going through the anterior rectus fascia, muscle, and peritoneum. The button is inserted through the stab wound and is fixed to the peritoneum by a silk purse-string stitch. The rectus fascia is fixed to the button in a similar manner after placing the rectus muscle between the flanges of the button. The main wound is then closed in layers without drainage.

The avoidance of repeated paracenteses is the purpose of the abdominal button. The method has another advantage in that it returns to the patient his own ascitic fluid with its protein content. The data and results in 6 cases in which the abdominal button was used are tabulated. There were 5 cases of Laennec's cirrhosis and 1 case of chronic constrictive pericarditis. Results were considered good in all cases but one. The button appeared to function in all cases.

JOHN L. LINDQUIST, M.D.

Gage, M., and Floyd, J. B., Jr.: Unnecessary Abdominal Operations for Pathological Lesions of the Genitourinary Tract. *Surg. Clin. N. America*, 1946, 26: 1247.

The clinical manifestations of lesions in the genitourinary tract often mimic disease of other abdominal organs. The author cites several reports from the literature to confirm this statement and to illustrate that from 25 to 30 per cent of patients with pathological lesions of the kidneys, ureters, or both, have had previous laparotomies for nonexisting lesions of the abdominal viscera.

The chief symptom of both intra-abdominal lesions and urologic diseases is pain. The sympathetic nerve supply to both groups of viscera is routed through the celiac ganglion and plexus so that pain from either may be widespread because of the integration of the somatic and sympathetic receptive fibers. Another source of confusion arises from the close association of the parietal peritoneum and the genitourinary tract. Pain is produced by obstruction of any sort in either the ureter or the gastrointestinal tract.

Since almost any disease of the genitourinary tract from the kidneys and perirenal tissues to the bladder, prostate, and seminal vesicles may simulate other intra-abdominal disease, an accurate differential diagnosis is the first requisite to avoid unnecessary operation. A careful history and physical examination, supplemented by selected laboratory procedures, are essential for arrival at a correct diagnosis.

The symptoms of acute lesions of the genitourinary tract are characterized by sudden onset. The fever is often higher and the pulse rate lower than in other abdominal lesions. The white blood cell count is higher and more stable in urologic disease. Nausea and vomiting are less common. Muscle spasm is of greater diagnostic importance than is pain or tenderness. If there is obstruction to the ureter the urine may show no abnormalities in the early stages of the illness. Certainly a routine study of the urine is essential in any patient with abdominal pain. Simple x-ray studies may reveal stones in the urologic tract, enlarged kidneys, or changes in the psoas shadows. The excretory pyelogram can often give enough information to eliminate an unnecessary operation. Sometimes cystoscopic examination and retrograde pyelography may be necessary.

The high incidence of unnecessary abdominal operations for unrecognized lesions of the genitourinary tract can be reduced only by constant vigilance and thorough preoperative diagnostic study.

EDWARD W. GIBBS, M.D.

GYNECOLOGY

UTERUS

Faugère, G., Labarbe, M., and Coiquaud, A.: The Value of the Operation of Halban in the Treatment of Genital Prolapse with a Dominant Large Cystocele (Sur la valeur de l'opération de Halban dans le traitement des prolapsus génitaux, avec cystocèle dominante). *Bordeaux chir.*, 1945, 1 and 2: 3.

Among the numerous operative measures advocated for the relief of genital prolapse, the operation of Halban is beginning to enjoy a certain vogue, especially in Bordeaux.

This technique, devised by Halban in 1919, is especially indicated in prolapse in which a cystocele is of paramount importance, particularly in young women.

Indeed, surgery is very limited for prolapse of the bladder. If one accepts the operation of Le Fort (colpocleisis), which gives the best results, we have only 3 different types of operations: (1) anterior myorrhaphy of the levators ani (Delanglade), (2) subvesical interposition of the corpus uteri (Schauta-Wertheim), and (3) vesicouterine fixation (of which the operation of Halban constitutes one variety).

Theoretically, the anterior myorrhaphy of the levators is an effective operation, but experience has proved that most of the time it can not be executed because the gap of these muscles at the level of the pubis is such that they cannot be brought together. Even if one is successful in bringing them together, the sutures will not hold, but cut through. Finally, a successful anterior myorrhaphy makes a posterior myorrhaphy inefficient.

The subvesical interposition of the corpus uteri is an excellent operation. Nevertheless, as stated by Cotte, 2 major disadvantages are inherent to this technique: (1) it can be performed only with a complete prolapse of the uterus and (2) it must be restricted to patients who have already passed the menopause, because pregnancy is difficult and delivery impossible when the uterus is fixed in such a fashion under the pubis.

The simple fixation of the bladder to the uterus without fixation of the uterus under the pubis seems, at first, to be restricted to cases in which the supporting structures of the uterus are intact or can be repaired. The result of this procedure may, perhaps, not be as good as that of the subvesical operation; on the other hand, it does not interfere with subsequent childbearing because the uterus is in a normal position.

This fastening of the bladder to the uterus can be accomplished through an abdominal or a vaginal approach:

a. The abdominal fixation of the bladder is a modification of the procedure of Werth, who used to fasten the uterus to the peritoneum of the bladder. The operation is executed in the following steps: opening of the vesicouterine pouch; separation of the vaginal wall from the bladder; suture of the bladder to the uterus, and, finally, obliteration of the vesicouterine pouch.

The abdominal fixation of the bladder is indicated in cases of cystocele without prolapse of the uterus and when the uterus cannot be exteriorized through the vagina. In these instances vaginal fixation is harder to accomplish.

b. Vaginal fixation is, in fact, named after Halban, whose technique is reported: midline incision on the anterior vaginal wall; separation of the vaginal wall from the bladder; opening of the vesicouterine peritoneal fold; bringing out of the corpus uteri; fastening of the vesical peritoneum back; suturing of the vesicovaginal fascia; closure of the vaginal incision, and thorough repair of the relaxed pelvic floor, which, of course, is a necessary part of the operation.

Amputation of the cervix, accompanied or not by the ligation of the uterine arteries, is often a necessary step. The introduction of catheters into the ureters prior to the operation is a great help when the operation is performed through the abdomen.

Nineteen patients were submitted to this operation by the authors with the report of poor results in 12 per cent. Six of the patients were not available for a follow-up study. GERARD GAGNON, M.D.

Coiquaud, A.: Halban's Operation. An Anatomic Study of the Vesicovaginal Fascia (A propos de l'opération de Halban. Étude anatomique du fascia vésico-vaginal). *Bordeaux chir.*, 1945, 3 and 4: 101.

In the author's opinion the most interesting stage of the Halban operation is the uterovesical fixation. He does not attach as much importance to reconstruction of the vesicovaginal fascia as does Halban and his disciples. In fact, Charrier has never encountered this fascia since employing the Halban operation. On the other hand, he did observe a sparse and more or less dense cellular tissue. In order to clear up this confusion between Halban's own account and the operative findings, Charrier requested the present author to make an anatomic study of the region.

The opinions of the writers who agree with Halban as to the existence of a vesicovaginal aponeurosis are cited as Cotte, Koenig, and Neel. Among those who do not agree with Halban on this point are Savariaud, Violet, Koenig and Doederlein, Rieffel, Poirier, Testut, Latarget, and, finally, Villemin. Thus, it appears that whereas surgeons generally accept Halban's description of a vesicovaginal partition between the bladder and vagina, the anatomists do not recognize such a structure. Other surgeons, such as Savariaud and Charrier, seem rather to confirm the findings of the anatomists. Most probably Goff is right in admitting the existence of a thin areolar

layer between the anterior vaginal wall and the wall of the bladder, and an analogous layer between the posterior wall and the rectum (vaginorectal fascia). These two layers unite on each side of the vagina to form the perivaginal fascia which forms a part of the endopelvic fascia. The character of this fascia renders it impossible to dissect it as a separate layer. It is illuminating that many gynecologists apply the term "fascia" to the muscular tunic of the vagina because grossly it resembles a heavy layer of aponeurosis.

Thus, the famous vesicovaginal fascia is probably only the peripheral and anterior portion of the vaginal wall.

A careful study of this region was made in 13 patients from 50 to 80 years of age, the majority without prolapse; the specimens were obtained chiefly from Villemin's laboratory. The bladder, urethra, vagina, and uterus were removed *en bloc*, including most frequently the pubis in front and a portion of the rectum behind. It was concluded from these studies that: (1) the bladder and vagina can easily be separated from each other, especially in older women or those with some degree of cystocele; (2) the 2 organs are separated by a very loose cellular tissue; (3) this loose cellular tissue becomes slightly condensed on contact with the bladder and vagina (as well as with the rectum) to form a "thin layer of areolar type;" (4) this thin layer is not possessed of any of the characteristics attributed by certain writers to a solid fascia or "vesicovaginal aponeurosis;" and (5) what has appeared to some surgeons like a fascia is in the writer's opinion nothing other than a variable portion of the vaginal wall itself, in the thickness of which a large number of cleavages are to be found. EDITH SCHANCHE MOORE.

Spatt, S. D.: Adenomyosis of the Uterus. A Study of 52 Reported Cases and Review of the Literature. *Am. J. Obst.*, 1946, 52: 581.

A series of 52 cases of adenomyosis uteri in which the endometrium was carefully studied is presented. The preponderance of the anovulatory endometrium in this series (72 per cent) seems to indicate a definite association with this condition.

Adenomyosis uteri occurs in from 5 to 10 per cent of all myomatous uteri. The uterine wall is the site of aberrant endometrial tissue in from 15 to 30 per cent of all cases of endometriosis. Adenomyosis uteri is most common in the fifth decade of life, as is endometrial hyperplasia.

Metromenorrhagia is the most common complaint, and dysmenorrhea the second most common, in patients with adenomyosis uteri.

The sustained interval of nonsecretion of the endometrium is a part of the process leading to actual endometrial hyperplasia and should be classified with it. The early interval endometrium seems to occur in younger women and endometrial hyperplasia in older women, generally. Adenomyosis is associated with anovulatory menstrual cycles in a large percentage of cases, which indicates that either hyperestrinism or lack of corpus luteum hormone is an important factor in the genesis of adenomyosis uteri. It cannot be said definitely, however, which one is responsbile. The high incidence of fibroids in adenomyosis uteri seems to indicate some relationship. However, this association is not frequent enough to make one conclude that one factor is responsible for adenomyosis uteri and uterine fibroids

Pelvic inflammation and ovarian cysts occur quite frequently in cases of adenomyosis uteri. However, the conclusion that these conditions are factors in the development of adenomyosis uteri does not seem justifiable. JOHN R. WOLFF, M.D.

Scheffey, L. C., Thudium, W. J., Farell, D. M., and Hahn, G. A.: Controversial Factors in the Management of Fundal Carcinoma. *Am. J. Obst.*, 1946, 52: 529.

While surgery has, and continues to play, the major role in the treatment of fundal carcinoma, the question today is to what extent irradiation therapy can be relied upon as a valuable adjunct. The authors survey 159 cases seen at the Jefferson Medical College Hospital from 1921 through 1945. One hundred and four of these patients are eligible for a 5-year survival study. No patients are untraced.

Surgery without irradiation has played a negligible role in the authors' management of these cases. Only 8 patients were treated by panhysterectomy with adnexal removal. There are 5 survivors, 62.5 per cent. Since 1940, 5 patients were treated in this manner and all have survived (from 2 to 4 years).

Radium alone, by intrauterine application, was used in 31 instances. Among the 24 patients eligible for the 5-year study, there were 11 survivors, or 45.8 per cent. Age, obesity, and cardiovascular disease, contraindicating surgery, were the prime reasons for this type of therapy.

Thirty-seven patients were treated by means of radium plus deep x-ray therapy; 36.6 per cent survived. The authors point out that many of the patients in this group had more advanced lesions.

Adequate surgery with some form of irradiation in addition, was used in 21 cases. The 5 year survival rate was 37.5 per cent. These patients received either radiation preoperatively, or x-rays postoperatively. The treatments were not planned and the time interval between surgery and radiation varied greatly. The adequate recovery in some cases that first appeared hopeless led to the adoption of the planned technique.

The authors' procedure in suspected cases of fundal carcinoma, is to perform a diagnostic curettage. Radium, either 50 or 100 mgm., is placed *in situ* while the curettings are examined by a rapid staining technique which permits a report in 4 hours. If they are malignant, a dosage of from 4,500 to 5,000 mgm. hours is administered. Surgery (panhysterectomy plus adnexal removal) is carried out from 8 to 10 weeks. Among 10 patients so treated prior to 1940, there were 9 survivors (90 per cent). The 1 death occurred 4 years after treatment and was due to cancer. Dur-

ing the past 5 years, there have been 21 patients treated by this method with 20 survivals (1 to 4 years). The 1 death followed an embolism 2 years after treatment. Although there was no autopsy, no cancer was noted prior to death. Of the uteri removed after the preliminary radiation, 54.8 per cent showed residual cancer.

The authors believe that this planned technique of preoperative radiation, followed by adequate surgery in from 8 to 10 weeks, will give the best results in fundal carcinoma. JOHN R. WOLFF, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Sirtori, C., and Bussolati, C.: Anatomical, Histological, and Clinical Observations of Ovarian Tumors (Considerazioni anatomo-istologiche e cliniche sui tumori dell'ovaio). *Tumori*, Milano, 1941, 27: 508.

The authors made a study of 80 cases of ovarian tumors, observed between 1933 and 1940, 46 of which were obtained at autopsies and 34 at biopsy. It is their observation that ovarian tumors appear from the 45th to the 65th year of life, being more frequent in women who have suffered a functional derangement of the sexual glands. They find it very difficult to classify ovarian tumors intelligently.

Granulosa cell tumors (17 cases) occur at any age. Such tumors may originate from undifferentiated primitive germinal cords, from the primitive cumulus oöphorus, from atretic follicles (Muller) or from normal adult follicles (the latter one denied by Meyer). The authors believe that tumors consisting of immature granulosa cells originate either from primitive mesenchymal cells, from germinal cords, or from the primary cumulus oöphorus, while the follicular tumors are derived from atretic follicles or mature follicles. Those tumors which have a lutein-like appearance must be considered an evolution of adult granulosa cell tumors. Clinically, the tumor causes the appearance of pubic hair in young girls, while in older women there is an accentuation of the sexual characteristics (menorrhagia). There is no logical reason to distinguish between granulosa cell tumors and thecomas, and it is better to refer to them as mixed tumors. The authors observed only 1 thecoma among the 17 granulosa cell tumors; consequently such a tumor is rare. The granulosa cell tumors have a tendency toward malignancy in the adult and a tendency toward luteinization in younger women. Tumors consisting mostly of granulosa cells have few blood vessels, while granulosa cell tumors containing many thecal cells have numerous blood vessels.

The Brenner tumor must not be regarded as a special tumor, neither is it always benign as those who regard it as oöphoroma or a fibroepithelioma believe. Its occurrence in old women gives it the tendency to be a scirrhous tumor. The authors conclude that the Brenner tumor must be regarded as an epithelioma originating from aberrant epithelial rests in the ovary or in its vicinity, that it may present cancerous characteristics, and that it may have to be considered a special aspect of the common ovarian cancer.

The seminoma of the ovary (disgerminoma) has the identical structure of the testicular seminoma. Histogenetically, the tumor may originate from

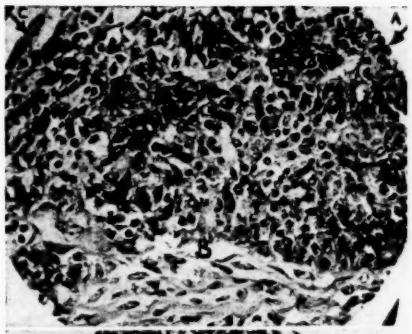


Fig. 1

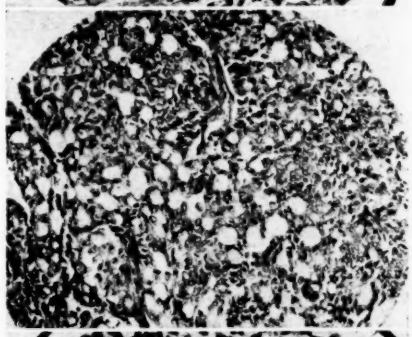


Fig. 2

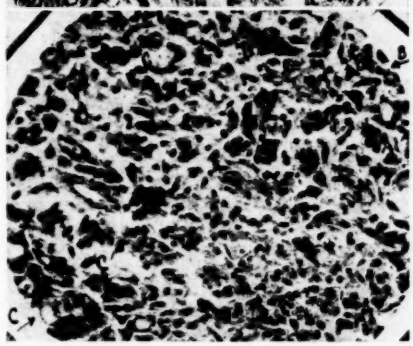


Fig. 3

Fig. 1. (Sirtori and Bussolati) granulosa cell type, and thecal cell type of tumor, and luteinizing elements next to it. (*A*, *B*, and *C*, respectively).

Fig. 2. Granulosa tumor, follicles, and cells losing the characteristics of the granulosa cell to become cancerous.

Fig. 3. Granulosa cell tumor in the luteinization stage and becoming cancerous. Observe a mixture of granulosa and thecal cell elements undergoing luteinic and cancerous changes.

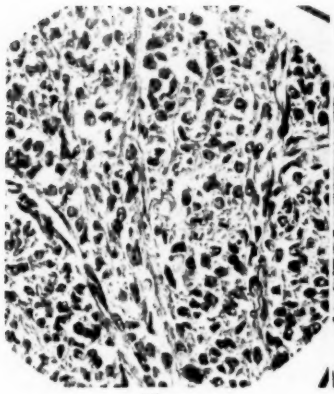


Fig. 4

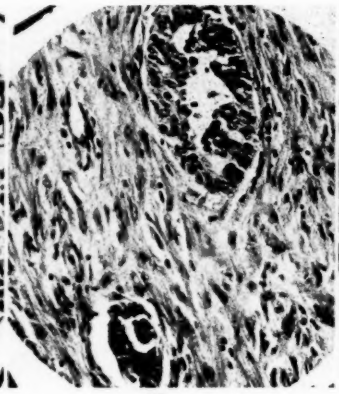


Fig. 5

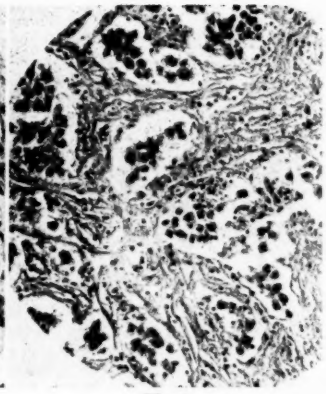


Fig. 6

Fig. 4. An area of a fibroma of the ovary which could be considered a thecal tumor.

Fig. 5. Papillary carcinoma; Brenner tumor.

Fig. 6. Arrhenoblastoma. Special aspect of the seminoma type of tumor with a tendency of the cellular element toward a tubular or cordlike architecture.

mesenchymal cells still undifferentiated sexually, or it may be considered an error of the primitive elements which may also cause the arrhenoblastomas. This agrees with the histogenetic interpretation of Plate, which follows: undifferentiated germinal epithelium: immature—disgerminoma in males and females; less immature—arrhenoblastoma in males and females, and granulosa cell tumor in the female.

The authors discard the idea that the tumor is an epitheloma or sarcoma, and regard it as a mesoblastoma. The study of their 3 cases leads them to conclude that such tumors are more frequently found in young women, that the tumors are functionless (different from the arrhenoblastomas and granulosa cell tumors which lead to male or female maturity) and that histologically the tumors are in the process of evolution because next to the seminoma are found areas similar to the arrhenoblastoma of the solid homogeneous type.

The arrhenoblastomas, very rare and important tumors, cannot be associated with the property of producing masculinization, because some of them do not have this function. The masculinizing tumor is made up of seminiferouslike cords, while the one deprived of such property has a tubular structure, the tubulotesticular adenoma of Pick.

Blasel and Haempel have isolated the substance causing masculinization. Removal of the tumor causes a regression of the masculine characteristics and of menstruation. This was verified in the case of a woman 26 years old who resumed all her feminine characteristics 10 months after the surgical removal of the tumor.

Other tumors, e.g., the luteoma and hypernephroma, may cause more or less virilism. The luteoma originates from granulosa or theca cell tumors which have undergone luteinization. Some consider this tumor to be derived from the lutein cells, but the case of Santi, in a woman in the menopause for 7 years, contradicts this, as the corpus luteum, being a transitory formation, is absent after the cessation of menstruation. That hypernephroma of the ovary may cause virilism is still doubted. Mulon considers the corpus luteum as transitory adrenal cortex. The absence of testicular hypernephroma is not sufficient to deny the existence of ovarian hypernephroma due to aberrant adrenal cortex. The authors have not encountered any ovarian hypernephroma.

A fibroma of the ovary may originate from ovarian stroma, from a fibrosed corpus luteum, from interstitial hemorrhage, from the unilateral development of a teratoma, or from interstitial inflammatory exudation.

The authors did not have any cases of muscle tumors of the ovary. They discuss a possible classification of cysts.

They believe that it is almost impossible to classify primary carcinomas of the ovary and conclude by suggesting that all ovarian tumors should be classified according to plans, one to include the histomorphologic, histogenetic and clinical criteria, and the other to include only the clinical criteria.

JOSEPH M. A. PAPE, M.D.

Helsel, E. V.: A Review of 100 Cases of Ovarian Cancer. *Am. J. Obst.*, 1946, 52: 435.

While considerable progress has been made in the diagnosis and treatment of uterine malignancies, this cannot be said of ovarian malignancies. With an incidence of 10 per cent of all ovarian neoplasms, and with a mortality rate that has been, and remains, appallingly high, ovarian cancer constitutes a major gynecological problem.

The author has analyzed 100 cases of ovarian cancer treated at the Elizabeth Stell Magee Hospital and the St. Francis Hospital in Pittsburgh, Pennsyl-

vania, from 1929 to 1943. Thirty-five cases could not be traced, while the remaining 65 cases were followed from treatment until death or present survival. Four of these patients were negroes. More than half of the patients were past the menopause although 2 were under 20 years of age; 41 per cent were nulliparous.

The insidious onset of symptoms plus the rapid progress of the tumor makes early diagnosis almost impossible. Sixty-eight per cent of the patients were considered incurable when first seen; 3 per cent were examined within 2 months of the onset of symptoms, and 18 per cent within 1 month. Abdominal pain, abdominal enlargement, loss of weight, and abnormal vaginal bleeding were the most frequent symptoms.

Helsel places ovarian malignancy into four clinical groups as determined at the time of operation. In group I, the tumor is completely removable without gross involvement of any other structure; in group II, the tumor is completely removable, but with some disturbance of other structures, such as adhesions; in group III, the tumor is only partially removable because of extension to near-by structures which cannot be removed, and in group IV, there is extensive involvement or distant metastases and only a biopsy may be obtained.

The degree of removability determines the survival time. Histological grading is of little value in the prognosis. Postoperative radiation is of value in that it increases the comfort and improves the psychological state of the patient, but its curative value is discouragingly low.

Despite the discouraging end results in advanced cases of malignant ovarian disease, the author believes that operation is worth while since even simple removal of the primary growth often enables the patient to carry on a life of usefulness in comfort, sometimes for years. JOHN R. WOLFF, M.D.

Romeo, M.: A Study of Pathological Associations between the Internal Genitalia and the Appendix (Contributo allo studio delle associazioni morbose fra genitali interni ed appendice). *Arch. ostet. gin.*, 1942, 6: 133.

In a previous article the author described 2 cases in which dermoid cysts of the ovary with torsion of the pedicles were associated with chronic appendicitis. He now describes a case in a woman of 27 years in which dermoid cysts of both ovaries without torsion were associated with chronic appendicitis. Histological illustrations of the findings are given.

In connection with these cases he discusses the possible reasons for such a pathological association. It has been claimed by some authorities that there is normally an appendiculo-ovarian ligament through which infections may be carried. Others deny this and claim that the inflammation is carried through adhesions which form between the two organs. A number of other theories are discussed and statistics showing the frequency of this association are presented.

The author concludes that the conditions are different in different cases. In some the infection is transmitted through the lymphatics of the appendiculo-ovarian ligament, in some through a newly formed network of lymphatics resulting from adhesions of the inflamed organs, sometimes extraperitoneally through the subserous connective tissue and sometimes through the peritoneum.

However, while this explains the transmission of inflammatory conditions from the ovary to the appendix, what is to be said of the cases in which a tumor of the ovary is associated with inflammation of the appendix? He believes that in cases in which there are adhesions between the appendix and the tumor the explanation is mechanical. The increased size of the ovary brings about such changes in the anatomical relations of the appendix that the organ becomes a point of least resistance and inflammation readily develops. In the cases in which there are no adhesions and the appendix and the ovary lie at some distance from each other, he believes that the association of the two pathological conditions is a mere coincidence. AUDREY G. MORGAN, M.D.

MISCELLANEOUS

Jacobson, C. E., Jr.: Unrecognized Obstruction of the Vesical Neck in Women. *N. England J. M.*, 1946, 235: 645.

Three cases of chronic obstruction of the vesical neck in women were presented, in which resection of all or part of the neck was performed with satisfactory relief of the symptoms.

Attention was drawn to the facts that the condition is not infrequent and that dire consequences, in the form of dilatation of the upper urinary system, may ensue if treatment is not instituted early in the course of the disease.

A search for the presence of early obstruction of the vesical neck in every case of chronic cystitis in women is urged, so that this condition may be recognized and adequate treatment instituted.

CHARLES BARON, M.D.

Cottalorda, J., and Gavaudan, F.: Intraperitoneal Hemorrhages of Genital Origin, not Including Ectopic Pregnancy (Les hémorragies intrapéritonéales, d'origine génitale en dehors de la grossesse extra-utérine). *Gyn. obst., Par.*, 1946, 45: 150.

Intraperitoneal hemorrhages of genital origin of nonovarian source are rare. They include rupture of a vein of a subserous fibroid, strangulation of the pedicle of a pedunculated fibroid, or hemorrhage in the course of a chorioepithelioma. Much more frequent than these are hemorrhages of ovarian origin. These may be either from a corpus luteum or from a graffian follicle, or from rupture of an ovarian cyst; lastly, menstrual blood may regurgitate into the peritoneal cavity via the tube; 4 cases of the last type having been observed by the authors. Corpus luteum hemorrhages occur shortly before menstruation, follicle hemorrhages in the middle of the men-

strual interval, while effusions of menstrual blood into the peritoneum naturally coincide with the menstruation.

The symptoms are sudden severe pain irradiating to the anus and lower abdominal region, sometimes accompanied by nausea and vomiting. Systemic signs like shock, weak pulse, and anemia are never observed. In most cases, the pains clear up after a few hours. Often, the same kind of attack may be repeated after a 4 weeks interval. As the symptoms are rather dramatic in the beginning, it is often difficult to rule out ectopic pregnancy or torsion of the adnexa, normal or diseased.

If, as often occurs, surgery is done under the wrong impression of an ectopic pregnancy or torsion of the adnexa, the management should be as conservative as possible: in cases of effusion of menstrual blood, ligation of the tube; in hemorrhages of follicles or corpus luteum, suture of the bleeding structure.

In most cases, it should be possible to differentiate the ovarian bleedings from ectopic pregnancy without laparotomy. They should be treated by hormonal therapy rather than by surgery.

WERNER M. SOLMITZ, M.D.

Cusimano, G. N.: Kidney Cysts in the Field of Gynecology (Le cisti renali nel campo ginecologico). *Arch. ostet. gin.*, 1942, 6: 248.

The medical literature reveals many cases in which a diagnosis of gynecological cyst, especially cyst of the ovary, has been made when the cyst was really of the kidney. This error may be due to the fact that the kidney is congenitally dystopic or there is an acquired ptosis of the organ, which brings the cyst in close relation to the ovary. This possibility should always be borne in mind by gynecologists in making a diagnosis of cyst of the ovary. They should have an accurate knowledge of the comparative frequency of gynecological and renals cysts and know that it is often impossible to make a differentiation between them from the history and clinical symptoms. Contrary to general belief, such cysts of the kidney often do not cause pain in the kidney region nor abnormalities in the urine. Nor does simple roentgen examination always suffice for differentiation. In all cases of doubt a pyeloureterographic examination should be made.

A case is described in a woman of 64 years in which the attending physician had made a diagnosis of cyst of the ovary. Suspicion was aroused by the fact that the patient had had a history of floating right kidney for some years, and ascending pyelography showed the right kidney to be ptotic and displaced to the left. The rhythm of evacuation of the urine was normal, excluding hydronephrosis, and the tests for hydatid cyst were negative. A diagnosis of solitary serous cyst of the right kidney was made and confirmed on operation.

The author believes that the best operation for such cysts is subtotal resection of the extrarenal part of the cyst and leaving a border to be fixed into the abdominal wound (marsupialization). Some authorities hold that this method gives rise to recurrence, but if the inner surface of the cyst is cauterized with gauze soaked in 10 per cent zinc chloride any remaining epithelium is destroyed and recurrence prevented. In exceptional cases in which there is destruction of almost the whole of the kidney parenchyma, nephrectomy is indicated.

AUDREY G. MORGAN, M.D.

Candido, R.: Clinicostatistical Study of 56 Cases of Hydatidiform Mole (Rilievi clinico-statistici su 56 casi di mola vescicolare). *Arch. ostet. gin.*, 1942, 6: 80.

In 56 of 21,534 pregnant women, hydatidiform mole was observed, a ratio of 1:385, which is higher than that cited by the majority of authors. Of the 56 patients, 29 were younger, and 27 older, than 32 years.

The cycle of fecundity can be divided into 3 periods: functional consolidation, stability, and functional diminution. Thirty-seven and five-tenths per cent of the author's material was observed in the first period, in women from 15 to 27 years of age; 29 per cent occurred during the second period, in women from 28 to 39 years of age, and 34 per cent were found in the third period, in women older than 39 years. Fifteen per cent occurred in primiparas and the greatest frequency of mole was recorded in women having had from 4 to 6 deliveries.

In 21 per cent of the patients the past history revealed certain diseases such as typhoid fever, rickets, nephritis, cholecystitis, cardiac insufficiency, and pulmonary disease, but inasmuch as in many cases a relatively long period of time elapsed between the disease and the appearance of the mole, the rôle of the preceding illness in the genesis of the mole was rather questionable. In 24 cases in which a Wassermann reaction had been performed, negative results were obtained. In 5 cases the mole became manifest during the second month of amenorrhea, in 19 during the third month, in 28 during the fourth month, and in 4 during the fifth month.

The anatomopathological study showed that in only 2 cases or 4 per cent of the entire material, the degeneration was partial, while in all of the remaining cases the development of hydatidiform mole was complete.

Fatal hemorrhage occurred in 3 cases, or 6 per cent of the entire material. In 1 case a benign mole, and in 2 cases, a destructive mole was present.

Albuminuria was noticed in 15 patients, or 27 per cent. In 9 patients, or 16 per cent, a chorioepithelioma developed. Malignant degeneration of a mole occurs with greatest frequency at the ages between 25 and 30 years.

In 10 cases, or 19 per cent of the author's material a spontaneous expulsion of the mole took place. In 42 cases, or 91 per cent, a curettage, and in 4 cases, or 9 per cent, a hysterectomy was performed.

Endometritis seems to play an important rôle in the pathogenesis of the mole.

JOSEPH K. NARAT, M.D.

Teilum, G.: Gonocytoma. *Acta path. microb. scand.*, 1946, 23: 242.

The author describes a group of homologous tumors in the ovary and the testicle to which he applies the name "seminoma series". In this group he includes: (1) seminoma and dysgerminoma, (2) chorioepithelioma, and (3) an intermediate group between these two. He quotes extensively from Shiller's article on mesonephroma ovarii and then shows in detail the morphological congruity of 4 testicular tumors with regard to Shiller's mesonephroma ovarii. He then states that notwithstanding the variegated histological features the tumor presents the same structure in the ovary as in the testis. In the testis it may show combinations with seminoma or seminomalike undifferentiated tumor parenchyma which is quite analogous to the dysgerminomalike tissue in the ovarian tumor. On the other hand, the testicular tumor may also show transition to chorioepithelioma (chorioma) with the production of chorionic gonadotropin. As a result of this the author classifies this type of tumor of the testis and ovary as an intermediate (adenopapilliferous or cystic) form between the dysgerminoma (seminoma) and the chorioma. In order to prove the relationship of this tumor to chorioma, he states that one must be able to demonstrate the production of chorionic gonadotropin even though no chorionic tissue may be demonstrated in the tumor, as was observed in his second case.

In this homologous tumor series, the clear cut seminoma (dysgerminoma) has to be looked upon as an undifferentiated type, as its relationship to the other forms is evident not only from the appearance of tubular formation in the seminoma tissue but also from the demonstration of chorionic gonadotropin in 4 cases. Hamburger showed 2 cases of histological seminoma with an output of 50,000 and 100,000 mouse units of chorionic gonadotropin, respectively, and Fauvet in 2 cases of ovarian dysgerminoma found an excretion of prolan A and prolan B.

The author believes that the seminoma series (gonocytoma) arises from the early stages of germ cells in the testis or persistent remnants of the medullary cords in the ovary. The potential capacity of these undifferentiated cells is not known.

TABLE I.—HOMOLOGOUS TUMORS OF THE DYSGERMINOMA (SEMINOMA) SERIES—GONOCYTOMA

	Ovary	Testis	Secretion of chorionic gonadotropin
Gonocytoma I	Dysgerminoma	Seminoma	o
Gonocytoma II	Intermediate form Adenopapilliferous or cystic Ovarian | Testicular		(†)
Gonocytoma III	Chorioepithelioma (—Chorioma) Ovarian | Testicular		††

The author assumes that the transition of the dysgerminoma (seminoma) of intermediate (adenopapilliferous) form to syncytial chorionic epitheliomatous proliferation with the excretion of chorionic hormone is suggestive of a totipotent cellular origin. He thus looks upon chorioepithelioma as parthenogenically arising from undifferentiated totipotent cells of the germ cell series.

As these cells in the ovary normally undergo retrogression, so that in most cases they leave no trace whatsoever, while in the testis they correspond to the earlier stages of the germ cells, we have in this way a natural explanation of the far more infrequent occurrence of the primary gonadal chorioepithelioma in the ovary than in the testis, with or without relation to the teratoma. Thus, the origin of chorioepithelioma in the ovary arises from a testicular anlage.

The author believes that all 3 tumors arise from testicular anlages and this accounts for their greater frequency in the testicle.

He states that true mesonephromas of the ovary, e.g., tumors arising from remnants of the mesonephros, occur, and describes 1 such case. He is of the opinion, however, that most tumors regarded as peritheliomas, endotheliomas, adenocarcinomas, angiosarcomas, and wollfian epitheliomas are intermediate forms of the seminoma series.

The author presents 9 photomicrographs of these testicular tumors showing their resemblance to the various types of ovarian tumors. He also appends complete descriptions of the gross and microscopic findings.

HENRY C. FALK, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Schneider, P.: Distal Ectopic Pregnancy. Implantation of the Ovum in the Cervical Mucosa. *Am. J. Surg.*, 1946, 72: 526.

In the present article, the author quotes the opinions of authorities, attesting to the rarity of true cervical implantation of the ovum. He reports 1 case of this condition.

The author states that there have been only 12 proved cases, and 7 cases in which he believed the condition was clinically possible. There are 11 additional cases in which the placenta involved the corpus, isthmus, and cervix. Finally, there are 2 reported cervical abortions.

True or primary cervical implantation is restricted to those cases in which the site of the placenta lies entirely within the cervix. The author defines the cervix as that portion of the uterus which lies between the external and internal os. A complete histological description is made of the three divisions of a pregnant and nonpregnant uterus. The 12 proved cases are described. The chief histological difference between the abnormal and normal implantation is the absence of the intervening decidua. Decidual cells may occur singly and in groups, but these may not be compared with the normal decidua. The decidua basalis limits the destructive action of the villi. However, in ectopic pregnancies the villi destroy the underlying structure. This is more pronounced in cervical implantations than in tubal pregnancies or placenta accreta.

The pathological description of cervical implantation is excellent. Clinically, the only constant observation was violent hemorrhage that in all cases led to active intervention. In only 2 cases was the correct diagnosis made. The condition has been diagnosed as incomplete abortion, bleeding varicosity, chorionepithelioma, and ruptured tubal pregnancy.

Treatment is variable, depending upon the amount of bleeding, the location, and duration of the implantation. Intracervical packing or some form of surgery was used in nearly all cases. Several late severe secondary hemorrhages occurred.

JAMES F. DONNELLY, M.D.

Armand, M. F.: The Intravenous Administration of Magnesium Sulfate as the Exclusive Treatment for Eclampsia (Traitement exclusif de l'éclampsie par le sulfate de magnésie en voie intraveineuse). *Obst. gin. lat.-amer.*, 1946, 4: 410.

Accepting the assumption of F. C. Irving, that eclampsia is not a primary disease of an organ but a state of spasm of its terminal arterioles, the author concludes that the only rational therapy of this condition involves the administration of antispasmodics. Following a review of the literature on the use of morphine and of magnesium sulfate in the treatment of eclampsia, he discusses the significance of changes in water metabolism in eclampsia, and the effect of water retention in creating spasms of the terminal arterioles. The vascular spasm slows the blood stream, produces edema, increases the viscosity of the blood, and, finally, causes ischemia of the tributary organs of the vessels involved, which explains the clinical picture of pre-eclampsia and eclampsia.

The antispasmodic effect of magnesium sulfate diminishes the nervous irritability, and rapidly and definitely diminishes the contractility of the smooth muscles. The blood pressure falls almost immediately and the circulatory equilibrium is restored. Diuresis is augmented. Frequently, micturition occurs shortly after the injection and the attack is interrupted. Magnesium sulfate is also said to have an anesthetic effect without reduction of the alkaline reserve of the blood.

Results obtained with the intravenous administration of magnesium sulfate by the author have been so good that he believes this is the specific treatment.

A 50 per cent solution of magnesium sulfate is employed, and the dose consists of 5 gm. of magnesium sulfate, or 10 c.c. of a 50 per cent solution. Should the attack recur, a new injection of 2.50 gm., or 5 c.c. of the solution, may be given every 4 hours until return to normal. If the patient, although apparently normal, continues to suffer from headache or cramps, or if the blood pressure shows a tendency to rise, a daily injection of 2.5 gm. should be given.

The total amount of the salt which can be injected without danger depends upon the severity and duration of the attack. In the 21 cases treated by the author, the attack was cut short in 3 cases with 2.5 gm. of magnesium sulfate, in 7, with 5 gm., in 1 case with 7.5 gm., in 4 cases with 10 gm., in 3, with 15 gm., and in 1 each with 25, 30, and 50 gm. respectively. As a rule, 5 gm. of the magnesium sulfate, or 10 c.c. of the 50 per cent solution, suffice. Frequently, a result may be achieved with less, and rarely is a much larger dose needed. In the presence of recurring attacks and deep coma, one should not hesitate to repeat the injections up to from 30 to 50 gm. If, on the other hand, the patient responds nicely to the first injection, further administration is contraindicated, since under these circumstances the resulting withdrawal of water from the brain might lead to acute dehydration of the brain and convulsions.

The solution is mixed with an equal portion of blood withdrawn from the vein, and the injection should be made very slowly. As a rule, the injection is well tolerated and there is only a slight sensation of warmth. Occasional excitement can be controlled by interrupting the injection for a moment and then continuing it more slowly. The injection is followed by abundant perspiration and, after a quarter or half hour, by micturition.

In the present series of cases, the blood pressure fell immediately from 3 to 6 cm. Hg. No other treatment is required. Venesection and the use of sedatives have been abandoned.

Nineteen of the 21 cases in the present series were treated exclusively by the intravenous administration of magnesium sulfate with recovery in all, and no maternal deaths or complications. There were 18 primiparas and 3 multiparas. Five women were seen during pregnancy, 4 in labor and 12 in the puerperium. In the 4 patients in labor, delivery was spontaneous. Two patients were admitted with fetal retention and 2 others gave birth to living infants. In the 5 patients seen during pregnancy, the pregnancy proceeded normally, but only 3 infants survived.

The series is too small to permit of definite conclusions, but the results are sufficiently encouraging to warrant further trial of this very simple method of treatment. EDITH SCHANCHE MOORE.

Naeslund, J., and Hedenstedt, S.: Investigations of the Permeability of the Placenta with the Help of Elliptocytes. *Acta med. scand.*, 1946, Supp. 170, p. 126.

According to the conception generally prevalent, the maternal and fetal vascular systems of the placenta are completely detached from one another, so that no direct transition of blood from the mother to the fetus, or vice versa, is possible. The authors believe that a leakage can sometimes occur in the placental septum and permit substances which do not permeate under normal conditions to pass over from the maternal vascular system to that of the fetus. This hypothesis may explain some of the complications of pregnancy as in erythroblastosis fetalis. Two investigations on the permeability of the placenta are described.

In the first experiment a transfusion of elliptocytic blood was given to a normal pregnant woman shortly before the onset of labor. No rise in the elliptocytic content of the child's blood was noted after birth. A similar transfusion given to a patient with nephropathy gravidarum resulted in a definitely increased elliptocytic content of the child's blood immediately after birth which gradually decreased in the next few days. GEORGE BLINICK, M.D.

Naeslund, J., and Nylin, G.: Investigations on the Permeability of the Placenta with the Aid of Red Blood Corpuscles Tagged with Radio-Active Phosphorus. *Acta med., scand.*, 1946, Supp. 170, p. 390.

This is a report of the second group of investigations of the permeability of the placenta. Red blood corpuscles from the mother, tagged with radioactive phosphorus, were reinjected before parturition. In 5 normal patients, no labeled blood corpuscles were found to pass through the placenta into the blood of the newborn child. In the sixth patient, whose pregnancy was complicated by asthma, there was a significant increase in the amount of labeled, radioactive red blood corpuscles in the newborn child.

The results of these experiments indicate that under certain conditions maternal red blood cells can pass through the placental membrane into the fetal vascular system. GEORGE BLINICK, M.D.

Lock, F. R., and Myers, R. T.: Endometriosis in Association with Pregnancy. *Am. J. Obst.*, 1946, 52: 556.

Although the information contained in the medical literature leads one to believe that the combination of pregnancy and endometriosis is a dangerous one, the authors report 2 cases in which patients treated conservatively for endometriosis subsequently conceived and had a normal prenatal course, delivery, and puerperium.

Few specific case reports of uncomplicated pregnancies in patients with endometriosis are to be found, but a careful search of the literature reveals that such cases are mentioned casually in articles which deal primarily with the gynecological aspects of endometriosis.

An analysis of 5 of such articles shows that approximately a third of the patients who are treated conservatively can successfully conceive, and indicates that the vast majority of such patients have a normal pregnancy. For this reason, the desirability of employing procedures which conserve the childbearing function in youthful patients with endometriosis is emphasized. JOHN R. WOLFF, M.D.

LABOR AND ITS COMPLICATIONS

Martini, J. L.: The Demelin Forceps 8; Ten Years of Experience in the Pedro A. Pardo Maternity (El fórceps Demelin 8. Diez años de experiencia en la Maternidad "Pedro A. Pardo"). *Obst. gin. lat.-amer.*, 1946, 4: 329.

The author describes the experience of 10 years with the use of the Demelin 8 forceps—533 applications from 1935 to 1945. The forceps weighs 620 gm., its total length is 40 cm., length of the blade, 175 mm., length of the handle, 225 mm., maximum width of the blade, 47 mm., maximum width of the window, 28 mm.; length of the fenestra expanding in the blade, 147 mm., length of the fenestra in the plane, 120 mm., width of the cuffs, 9 mm., cephalic radius of the curvature, 170 mm., length of the bar of articulation, 177 mm., and the distance separating the two screws of articulation when forceps is mounted, 160 mm. The terminal portion of the blades from the windows to the beak has the form of a *U* and the symmetry of the cuffs at this level permits easy determination of the axis of the blade, the axis prolonged behind indicating the general axis of the instrument once mounted. This feature is not found in the forceps of Tarnier or Levret, in which the cuffs are asymmetric. Fenestration of the handles make it lighter, and except for a little more pronounced cephalic, pelvic, and perineal curvatures, the forceps is almost straight. Demelin gives great importance to the incurving below the extremity of the handle, so that the bar of articulation situated in the plane of the

axis of the blades constitutes one-fifth of the curvature and assures that both blades are in front of the other which impedes tangential escape of the head. The first absolute general principle is to employ the least possible force. Introduction of the blades, articulation, and extraction should be accompanied by the usual precautions as in any other forceps application.

The long blades of the Demelin 8 (from 0.125 to 0.15 m. instead of 0.05 m.) act like a kind traction that attenuates considerably the bumps and rubbings by the incidence of very oblique pull on the resistant walls of the pelvic cavity, whereas shorter blades accentuate the contacts between the pelvic walls and the presentation by reason that the angle of incidence (of the blades to the fetal part) approximates much more the straight short arm of the lever. The almost straight blades of the Demelin 8 adapt perfectly with the presentation and the soft parts herniating by the windows. This ample cephalo-instrumental contact permits a secure hold which is impossible if the blades only depend on their beaks like in the divergent forceps.

In the last 10 years, there were 17,008 deliveries with 533 Demelin 8 forceps applications, 88.55 per cent (472 cases) in primiparas; 8.06 per cent (43 cases) in secundiparas, and 3.39 per cent (18 cases) in multiparas; 54.98 per cent of the patients were below 30 years of age while 40.02 per cent were above that age.

The causes for intervention were: fetal suffering in 60.03 per cent of the cases, prolonged expulsive period in 40.52 per cent, failure of rotation in 29.83 per cent, dystocia of contraction in 23.62 per cent, perversion of rotation in 3.17 per cent, maternal exhaustion in 2.43 per cent, eclampsia in 2.25 per cent, prophylaxis in 2.06 per cent, amniotic infection in 1.68 per cent, relative narrow pelvis in 0.56 per cent, vaginal diaphragm in 0.56 per cent, polypiform edema of Rouvier in 0.27 per cent, and excessive fetal volume in 0.18 per cent.

There were 76 episiotomies, 14.07 per cent of the total interventions. There was only 1 face presentation; the rest were all vertex presentations. The 3 maternal deaths are not accounted for by the forceps, hence the maternal mortality may be said to be nil. With respect to the maternal morbidity, it occurred as follows: in first degree perineal lacerations, 18.38 per cent or 98 cases; in second degree, 4.69 per cent or 25 cases; in third degree, 0.93 per cent or 5 cases; in vaginal mucosa lacerations, 1.50 per cent or 8 cases; in vulvar mucosa lacerations, 0.18 per cent or 1 case; in cervical laceration, 0.18 per cent or 1 case; in shock 0.56 per cent or 3 cases; in vulvovaginal thrombus, 0.18 per cent or 1 case; in febrile puerperium, 6.19 per cent or 33 cases; and in afebrile puerperium, 2.43 per cent or 13 cases. In the 533 interventions death occurred 36 times or in 6.75 per cent. Applications in the superior strait gave a mortality of 33.33 per cent; in the inferior strait, one of 6.13 per cent; and in the excavation, one of 5.93 per cent. As to the fetal morbidity, only benign lesions were observed, generally echymosis of the cheeks and scalp, never serious traumatisms as caving-in or fractures of the parietals, nor ocular lesions, or facial paralysis. In conclusion, the Demelin 8 is a convergent forceps, almost straight, with double posterior articulation, with traction passing by the center of mobility of the head, realizing a solid and symmetrical application, respecting the spontaneous mobility of the head, scarcely traumatizing, and requiring less force for extraction in comparison with other types of forceps. Its maternal mortality is nil, the low traumatic maternal morbidity consisting mostly of benign lesions of the perineum; its maternal infectious morbidity is also low; its fetal mortality is 6.75 per cent; and its fetal morbidity is practically nil.

A. B. Vicencio, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Broster, L. R., and Gardiner-Hill, H.: Addison's Disease Successfully Treated by a Graft. *Brit. M. J.*, 1946, 2: 570.

Broster and Gardiner-Hill describe the case of a young woman in whom a diagnosis of Addison's disease was made 9 months previously on the basis of the clinical and biochemical findings. An adrenal gland from a patient with the adrenogenital syndrome was ingrafted, and as a result the symptoms and signs of Addison's disease disappeared. Tests by means of the withdrawal of sodium chloride showed that her blood sodium no longer was below normal, and at the last test, 14 months after operation, no substitution therapy with sodium chloride was required.

The tumor of the gland was from a 21 year old woman who had hirsuties, adrenal virilism, hallucinations, and depressions, and who excreted 29.5 mgm. of ketosteroid daily. The left adrenal gland was used; it was hypertrophied to 2 to 3 times its normal size. Its large unbranched vein was cut long, the vein was perfused with heparin solution, and the graft was placed in normal saline solution.

In the recipient an incision was made along the outer border of the left rectus muscle. The rectus was retracted medially. The deep epigastric artery and vein were exposed and cut medially, the wound was bathed in heparin solution, and the artery and vein were separately piloted into the adrenal vein and anchored. The recipient menstruated unexpectedly on the second day after the operation.

During subsequent examinations the graft was palpable and tender, especially before and during a period. The patient's blood pressure rose to normal or even hypertensive levels, the pigmentation disappeared almost completely, and the sodium chloride level did not diminish even when substitution therapy was omitted. The authors believe that the cortical deficiency was corrected by the graft, and they maintain that a cure was obtained 14 months after operation. DAVID ROSENBLOOM, M.D.

Fine, J., Frank, H. A., and Seligman, A. M.: The Treatment of Acute Renal Failure by Peritoneal Irrigation. *Ann. Surg.*, 1946, 124: 857.

The authors believe that "certain types of acute renal failure need not be fatal if the period necessary for repair can be provided by utilizing an extrarenal pathway as a temporary substitute for the normal excretory function of the kidney. The peritoneal membrane has long been recognized to be an excellent dialyzing membrane readily permeable to water and crystalloids. Peritoneal irrigation makes use of this dialyzing capacity for the removal of diffusible substances from the plasma and ultimately from the extracellular fluid."

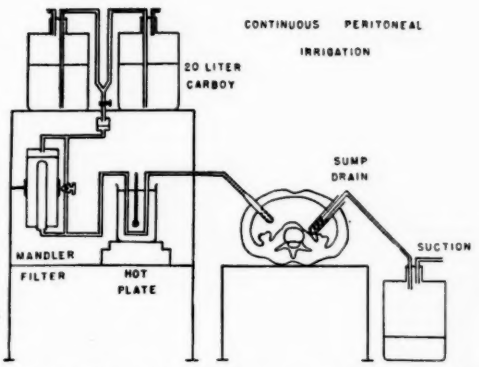


Fig. 1. (Fine et al.) Diagrammatic representation of the circuit for continuous peritoneal irrigation. (Courtesy of J. B. Lippincott Co.)

It has been determined in the dog that adequately conducted peritoneal irrigation would provide as much as from 40 to 75 per cent of the normal renal function.

The authors describe in detail their method, and the peritoneal irrigation apparatus employed (Fig. 1). The irrigating fluid is a modified Tyrode's solution to which is added the sodium salt of heparin, penicillin, and sodium sulfadiazine. Heparin is used to prevent the formation of fibrin and intestinal adhesions; penicillin and sulfadiazine are employed as a prophylaxis against infection; the sodium sulfadiazine should be omitted if renal sensitivity to sulfonamides is present or suspected. Protein is not employed because edema of the peritoneal membranes does not occur as a result of irrigation. When protein appears to be indicated, as illustrated in the fourth reported case, gelatin is employed because the large amounts of protein required make the use of human albumin impracticable, although probably preferable. The gelatin solution should be adjusted to a *p*H of 7.5 with concentrated sodium hydroxide.

The flow of fluid is illustrated in Figure 1. Under local infiltration anesthesia, the inflow and outflow tubes are inserted into the peritoneal cavity through a small incision in each flank. The stainless steel sump drain is directed into the cul-de-sac of Douglas for drainage; this type of drain obviates the plugging of the tubes as long as fluid is kept running in.

Collateral therapy is necessary for maintaining nutrition and water soluble vitamin requirements, for correcting anemia, acidosis, hypoproteinemia, and for the management of concomitant disease.

The authors admit and stress that this interesting therapeutic method is still in the experimental phase. They have to date established: (1) that properly per-

formed peritoneal irrigation can eliminate all clinical and chemical evidence of uremia; (2) that significant clinical improvement may occur in from 36 to 48 hours; (3) that the total time required will vary with the duration and severity of the uremic state, the degree of saturation of the tissues with the retained products, the degree of dehydration or edema, the nutritional state, the food intake, the rate of protein catabolism, the presence of concomitant disease, and the rate of efficiency of the peritoneal irrigation; (4) that irrigation does not exert a deleterious effect on the peritoneal structures; and (5) that the efficiency of irrigation so far as blood urea clearance is concerned does not diminish with time and exceeds the minimal degree of renal excretory function (10 to 15 per cent) necessary to avoid the reaccumulation of nonprotein nitrogen of urea.

The time necessary for repair of the kidney injury and recovery of sufficient kidney function cannot be forecast; this will vary from one type of injury to another and from case to case with the same type of injury. Lesions that are capable of repair in the course of a few weeks should respond to this form of therapy because it probably can be maintained safely that long. To date, this form of therapy had been maintained for 12 days.

The chief hazard is the possibility of the development of peritonitis. This danger has been minimized by the introduction of a bacterial filter on the inlet side of the irrigating system, with chemotherapy, and with careful quarantine of the abdominal wounds and tubes by proper dressings. The peritoneal drainage fluid has yielded the following bacteria: the Escherichia coli in 2 cases without significant clinical effects, and the Escherichia coli, Clostridium welchii, Staphylococcus albus, and enterococci without peritonitis in 1 case, as evidenced at autopsy. The inflow and outflow tubes should be so placed that dislodgment necessitating subsequent replacement should not occur. It is highly important to observe the fluid and electrolyte balance.

Pulmonary edema occurred in 75 per cent of the cases because of the intravenous administration of fluid in excess of tissue requirements for fluid in anuria and because of the presence of acidosis. The fluid requirement during anuria consists only of the amount of the water lost by evaporation which is about 1,000 c.c. daily unless fever, diarrhea, vomiting, or sweating are also present. Intravenous fluid is necessary as a vehicle for glucose and amino acids. Glucose in amounts of from 100 to 200 gm. daily will satisfy the caloric needs and will prevent acidosis as the peritoneal irrigating fluid contains 2 per cent dextrose solution.

Unfortunately, the proper time for peritoneal irrigation has not yet been established because it is impossible to determine the precise existence of irreversible damage. It should be begun after the onset of full-blown uremia, and discontinued following the return of sufficient renal function to prevent azotemia and to sustain a normal fluid and electrolyte balance.

In the discussion of this paper before the American Surgical Association, E. D. CHURCHILL related his experience with renal shutdown following severe trauma on the battlefields which was resistant to all known forms of therapy. He expressed a hope that peritoneal irrigation as described by the authors will prove successful in combating renal shutdown following severe trauma. A. B. MCGRAW reported a successful outcome in a child with nephrosis treated by peritoneal irrigation. A. O. WHIPPLE believed that the authors had established a point of departure in the therapy of anuria and uremia which will apply to surgical and medical problems, and hence this constitutes a real advance.

J. E. RHOADS and R. COLP discussed the method of external dialysis. FINE conceded that this method may prove satisfactory, but objected to external dialysis because it imposes an arteriovenous anastomosis on an already seriously ill patient. He again stressed the point that peritoneal irrigation is still in the experimental stage and that it is not yet considered a satisfactory clinical method.

ROBERT TURELL, M.D.

Alcorta, L. F., Dante, J., and Sandro, R. E.: Renal Tuberculosis in a 6 Year Old Girl (Tuberculosis renal en una nina de 6 anos). *Rev. argent. urol.*, 1944, 13: 294.

A case of renal tuberculosis in a 6 year old girl is reported by the author because tuberculosis of the kidneys is rare at that age. According to the statistics, children younger than 10 years form only 0.4 per cent of the entire material operated on for tuberculosis of the kidneys.

The patient was admitted with complaints of polyuria and nocturia of 1 year's duration. There were no pains in the lumbar or bladder region and palpation of the kidneys did not provoke any painful sensations. A flat picture of the abdomen showed an abnormally large shadow of the right kidney while an excretory urogram furnished the typical picture of right pyonephrosis. Roentgenograms of the chest revealed calcified residues of a primary infection. The urine was turbid and gave an alkaline reaction The sediment contained numerous leucocytes. The bacteriologic examination established the diagnosis of tuberculosis.

The involved kidney was removed and the histological diagnosis of the specimen was found to be follicular and caseous tuberculosis. The patient made an uneventful recovery.

JOSEPH K. NARAT, M.D.

Voitashevskii, A. B.: A New Method of Suturing the Renal Pelvis in Pyelotomies. *Vrachebnoe Delo*, 1946, No. 6, 347.

After the kidney has been exposed, the pelvis incised, and the stone removed in the usual manner, the edges of the incision are seized by Pean or Kocher forceps, one on each margin, and brought together so as to approximate the two wound borders at this point. A fine catgut suture is then manipu-

lated over the ends of the two forceps and tied so as to produce a perfect approximation of the mucosal edges. A varying number of these ligature sutures (1 to 3), corresponding to the length of the incision, may be applied. Care is taken to grasp only the outer layers of the incision and avoid the mucosa. However, in difficult conditions, such as pyelotomies *in situ*, the entire thickness of the wound edge with perhaps some of the mucosal surface of the renal pelvic cavity may be included. A row of sutures burying this first row may be applied to the surrounding fatty tissues.

The author employed this method in 10 pyelotomies and found that the wound healed uniformly in from 2 to 3 weeks. He claims the following advantages for his method:

The suture by ligation removes the danger of hemorrhage in pyelotomies and the possibility of injury to the renal blood vessels which pass close by. Technically, the method is much easier than the usual manner of suturing the incision in the kidney pelvis, especially in the operation *in situ* on this structure. As the cavity of the kidney pelvis is not penetrated by the suture material, the danger of foreign body irritation from penetrating suture material with recurrence of the stone is removed. The rapid healing of the perfectly approximated wound edges forestalls invasion by infectious processes of the incised kidney pelvis. JOHN W. BRENNAN, M.D.

Dees, J. E.: The Use of a Fibrinogen Coagulum in Pyelolithotomy. *J. Urol.*, Balt., 1946, 56: 271.

If a soft calculus in the renal pelvis is fragmented during its removal, or if a small stone is unsuspected, or is not located and left behind, a recurrence of calculous disease is almost certain to follow. In many cases the x-ray shadow of a small stone is obscured by the opacity cast by a larger stone in the kidney. The interior of the kidney pelvis cannot be visualized through a pyelotomy incision, and a search for the stone must be made blindly with appropriate forceps or by digital palpation; in such a search the kidney may be traumatized considerably. A small free stone may move from one calyx to another; blood clot may cover a small stone so that crepitus cannot be elicited; radiolucent stones and minute calculi may fail to show in the roentgenogram; neither is irrigation of the renal pelvis and the use of routine x-rays of the kidney on the operating table, infallible.

The authors have developed the following technique for pyelolithotomy:

At open operation, solutions of human fibrinogen and thrombin are simultaneously injected into the renal pelvis, filling it completely. A firm tenacious coagulum results, which forms a perfect mold of the cavity of the pelvis, regardless of its configuration, and within this clot are incorporated all free stones. The coagulum is removed through the usual pyelotomy incision after coagulation, and all free stones are incorporated within the clot. Coagula formed by the action of thrombin on human fibrinogen solutions fulfill most closely the theoretical requirements: (1) the substance should be fluid so that it can be injected into the renal pelvis; (2) it should coagulate uniformly, completely, and rapidly; (3) the coagulum should be malleable and elastic enough to permit withdrawal of the mold of each calyx through its narrower infundibulum and to permit removal of the entire clot through a short renal pelvis incision; (5) it should be noninjurious to the kidney; (6) the coagulum should dissolve or disintegrate spontaneously if a particle is left; and (7) the coagulable substance should be unaffected by small amounts of urine or blood. Two per cent clotting globulin produces coagulation of the fibrinogen solution in 30 seconds; the tensile strength of the coagulum is 10 to 20 times as great as that of human blood clot; the coagulum is disintegrated by urine in 6 to 24 hours. Coagulum pyelolithotomy permits removal of all free pelvic stones, avoids fragmentation of calculi, minimizes kidney trauma, and avoids the necessity of complete surgical mobilization of the kidney, but it cannot be expected to remove a calyceal calculus larger than that of its infundibulum, or one which is imbedded or adherent to the renal pelvis wall. When severe infection is present and the urine is mucoid, preventing complete dissemination of the injected fluid throughout the pelvis and around each calculus, aerosol O.T. (0.1 per cent) is used to irrigate the renal pelvis first, as a wetting agent, which permits better distribution of the solution.

After surgical exposure of the kidney pelvis and upper ureter, (1) the lumen of the ureteropelvic junction is gently occluded with a suitable instrument or tape; (2) a 4 mm. incision is made in the renal pelvis; (3) a 12 F. rubber catheter with two eyes is introduced into the pelvis until the second eye lies just within the pelvis; it must fit snugly, one end being clamped, if necessary, and urine is aspirated from the pelvis; (4) the pelvis is calibrated by distending it with normal saline solution; (5) the pelvis is lavaged with 0.1 per cent aerosol solution in amounts not exceeding two-thirds of the capacity, if considerable infection is present; (6) the pelvis is lavaged with fibrinogen solution and is aspirated; (7) fibrinogen solution in the amount of 90 per cent of the predetermined pelvic capacity is injected into the pelvis; (8) simultaneously, by means of a small syringe and needle, an assistant injects one-tenth the amount of the pelvic capacity of 2 per cent clotting globulin through the wall of the urethral catheter into its lumen, so that the two materials are intimately mixed as they enter the renal pelvis; (9) 4 minutes are allowed to elapse; (10) the urethral catheter is removed and the small pyelotomy incision is enlarged; and (11) the coagulum is slowly but firmly withdrawn. The pyelotomy incision is closed completely.

The authors had perfect results in 28 cases, and partially satisfactory results in 6 cases. The treatment failed in 2 cases. Illustrations showing the gross appearance of the clot are presented.

DAVID ROSENBLOOM, M.D.

Howard, F. S.: Instrumental Perforation of the Ureter. *J. Urol.*, Balt., 1946, 56: 319.

Eight cases of proved instrumental perforation of the ureter are reported. The condition is probably more common than the small number of proved cases reported might indicate.

When the rent in the ureter is small and there is no ureteral obstruction below it, there is ordinarily no untoward reaction to the injury, and the patient readily recovers without surgery. However, a very serious state of affairs may be reached if there are complicating urological conditions or if the opening in the ureter is large enough to allow extravasation to continue in large amounts. Perforations by large instruments are more apt to be serious than those produced by small ones.

In itself, instrumental perforation of the ureter calls for observation rather than immediate surgery. The time for drainage is determined by surgical judgment based upon the individual findings in each case. Most patients who are going on to recovery without surgical intervention are either well or nearly well 24 hours after the injury.

JOHN A. LOEF, M.D.

BLADDER, URETHRA, AND PENIS

MacLean, J. T., and Gerrie, J. W.: Repair of War Wounds of the Bulbous and Membranous Urethra with Split Thickness Skin Grafts and Penicillin. *J. Urol.*, Balt., 1946, 56: 485.

The ideal time to repair injuries of the urethra is immediately after shock has been controlled. It is then possible to do an end-to-end anastomosis, even when there is considerable loss of tissue.

In injuries of the bulbous and membranous urethra free grafts are more practical than local flaps (Thiersch-Duplay) or tubed pedicles (Gillies, Davies). McIndoe, in 1937, described an improvement of this technique, in which he used specially designed trochars and tubes for the insertion of the graft after a preliminary correction of the chordee. He maintained the urethra in a distended position for a period of 6 months by using indwelling gum elastic dilators. Humby, in 1941, described a technique for the cure of hypospadias, in which a full thickness skin graft was built up around a catheter, glued to it, and buried in the septum between the corpora cavernosa by splitting the penis longitudinally.

In the cases presented, it was decided to use a combination of these latter two techniques with certain modifications.

The operative procedure is given as follows:

1. Suprapubic cystostomy. The urinary stream should be diverted by suprapubic cystostomy.

2. Exposure of the area of defect. The patient is placed in the perineal position on the table.

The anterior urethra is thoroughly irrigated with protargol, ¼ of 1 per cent, and a 22 F. sound is passed to the point where it meets obstruction. Another sound is passed into the suprapubic opening through the internal sphincter, and along the posterior urethra until it meets obstruction.

An inverted perineal incision is then made, and the ischiorectal space on each side is opened by blunt dissection. The median raphe is divided and the rectourethralis muscle is exposed and divided, which exposes the urethra, where the ends of the 2 sounds can readily be palpated.

An incision is made over the point of each sound, and the scar tissue between is excised.

A 24 F. Foley bag catheter is then passed through the external urinary meatus, grasped as it appears in the perineal incision, and threaded on into the posterior urethra. The balloon on the catheter is distended, and the catheter is withdrawn until the balloon meets the bladder neck. The exposed catheter in the perineal wound is the area of the catheter to be covered by skin graft.

3. Preparation of the urethral graft. A split thickness graft of the desired size, from 15/1000 to 18/1000 of an inch thick, is cut with a Padgett dermatome from the inner aspect of the upper arm. The exposed portion of the catheter in the perineal wound is drawn further into the wound by decompressing the balloon, and the skin is placed around the catheter to form a tube. It is held in place by a few mattress sutures of 0000 plain catgut.

4. Implantation. The perineal portion of the catheter with the attached graft is then replaced, and the ends of the graft are carefully threaded into the exposed urethra at the proximal and distal ends, so that some of the graft overlaps normal urethra at each end. The seam of the tube graft should lie anteriorly. No attempt is made to obtain accurate end-to-end anastomosis as any surplus portion of the graft that does not take will slough out. The catheter with its covering partial thickness graft is now in the exact position desired. The balloon on the catheter is distended with water and tied to prevent the catheter from slipping out. The urethra must be kept distended with a catheter for at least 10 weeks after the operation, then dilated at weekly intervals.

5. Closure of the perineal wound. The soft tissues are closed over the graft with a few mattress sutures of 0000 plain catgut on an atraumatic needle. A medium sized Penrose drain with a wick is inserted and brought out through the angle of the perineal wound. The wound is then closed with a subcuticular continuous running suture of No. 1 or 2 catgut.

The 36 F. suprapubic Malecot catheter is reinserted in the suprapubic wound.

6. Modification of the grafting technique. In the second case, the tube graft was built up on an intratracheal inflation cuff which was pulled on over the Foley bag catheter. By inflating the cuff slightly, it was possible to build this portion of the urethra much larger than the normal caliber, which allowed in advance for shrinkage as the healing and the surrounding fibrosis became complete.

Multiple holes were cut in the intraurethral portion of the catheter so that irrigation of the anterior

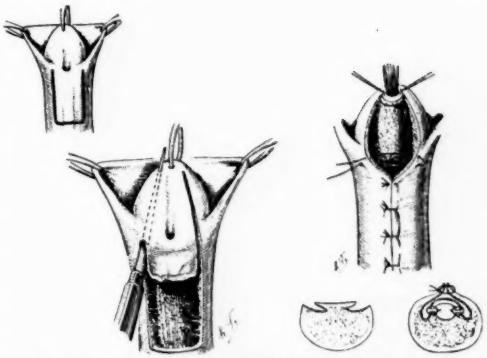
urethra could be carried out, if desired, without disturbance of the graft. JOHN A. LOEF, M.D.

Leveuf, J.: The Treatment of Hypospadias (Le traitement de l'hypospadias). *J. chir.*, Par., 1946, 62: 90.

Preliminary operations for the correction of a curvature or torsion of the penis may be performed on boys at the age of 3 or 4 years, but a reconstruction of the urethra should not be attempted before the genital organs attain sufficient dimensions. In other words, not the age of the child but the development of his genital organs is the determining factor. Usually this operation can be performed at the age of 8 years. However, the operation may have to be postponed in a child with adiposogenital dystrophy. In such cases a preliminary treatment with thyroid, pituitary, or/and testicular extracts is indicated.

For correction of a curvature of the penis the author recommends Ombredanne's technique. It should be remembered that fibrous bands responsible for the curvature are found not only in the median but also in the lateral portions of the organ. The hemorrhage is never of any importance. After the operation the author applies extension to the penis (10 to 25 gm.) until cicatrization is complete.

The torsion observed by the author was approximately 90 degrees, and in each instance to the left. For its correction he recommends a vertical incision on the right side of the root of the penis, extending from above the pubic bone down to the middle portion of the scrotum. After dissection of the cavernous bodies from the pubis to the perineum, a correction of the position is obtained by re-torsion and is maintained by a series of sutures with a nonabsorbable material which is carried to the suprapubic fibrous tissue. The pyramidal muscle on the right side may be turned downward and attached to the cavernous bodies, but as a rule this is not necessary.



Figs. 1 and 2 (Leveuf). Modified Mathieu's technique. The cross sections show the glans before and after the operation.

As to the reconstruction of the urethra, it is extremely important that the cutaneous flap contains no hair follicles as otherwise calcareous deposits may form. The lower surface of the penis serves the purpose very well. The diameter of the reconstructed urethra should be sufficient to permit normal micturition. To diminish the chance of a fistula formation, the knots of the sutures should be placed within

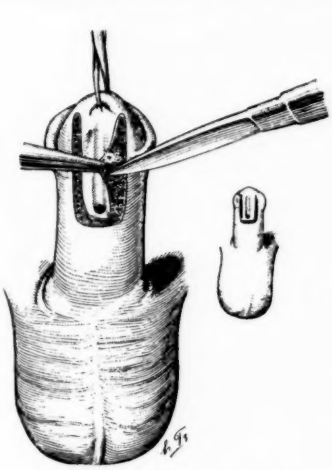


Fig. 3

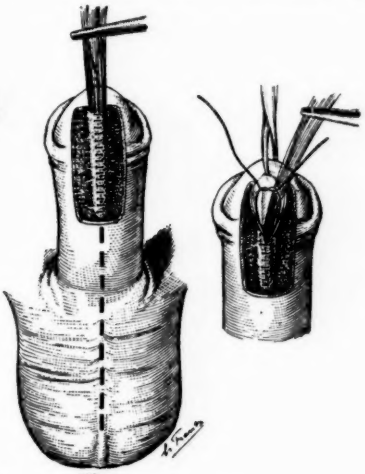


Fig. 4

Fig. 3. Treatment of hypospadias of the penis. Dissection of flaps. Insert, Direction of incision.

Fig. 4. Treatment of hypospadias of the penis. Reconstruction of urethra is finished. Insert, Mode of suturing the urethra.

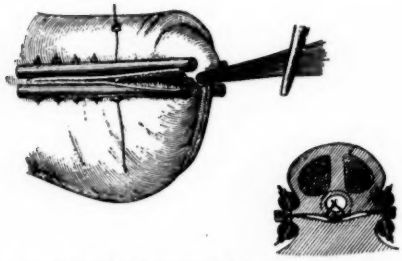


Fig. 5. (Leveuf) Treatment of hypospadias of the penis. Attachment of the penis to the scrotum. Insert, Plan of operation.

the urethra. Finally, the suture lines of the urethra and the flap should be separated one from another by as much cellular tissue as possible. If this is done and one of the sutures of the urethra gives, the resulting fistula closes spontaneously.

For the treatment of hypospadias of the glans or one located at the junction of the glans and the prepuce the author recommends a modified Mathieu's technique (Figs. 1 and 2).

Figures 3, 4, and 5 show the method of treatment of hypospadias of the penis employed by the author.

In hypospadias at the junction of the penis and the scrotum, two stages are required for reconstruction of the urethra. First, a urethral canal which leads from the scrotal meatus to the lower portion of the penis is constructed. Six months later the same procedure is employed as in hypospadias of the penis.

JOSEPH K. NARAT, M.D.

Lenowitz, H., and Graham, A. P.: Carcinoma of the Penis. *J. Urol.*, Balt., 1946, 56: 458.

Carcinoma of the penis may begin as a relatively benign warty excrescence which at a certain stage undergoes malignant degeneration, as a small neoplastic growth which after a variable period of time fissures and ulcerates, or as a scaly seborrheic or psoriaform-like patch which may not ulcerate or show its true neoplastic nature for many months or years. The differential diagnosis includes chancre, chancroid, tuberculosis, balanitis, herpes progenitalis, gummatous ulceration, granuloma inguinale, and psoriasis.

From 1931 through 1944, the Tumor Clinic of the Veterans' Administration Hospital at Hines, Illinois treated 13,490 white and 982 colored patients for all types of cancer. Of these, 100 white patients and 39 negro patients were admitted for carcinoma of the penis, an incidence of 0.96 per cent for both groups. Negro patients constituted 28 per cent of the patients with carcinoma of the penis. Of all the colored patients admitted for carcinoma of all types, 3.791 per cent had carcinoma of the penis, whereas only 0.741 per cent of the white patients were admitted for this condition.

An average of 21 months had elapsed after the onset of the penile lesion before these patients arrived at Hines. Previous treatment had included circumcision, local and insufficient excision of the tumor, local antiseptics or arsenicals, and insufficient radium or x-ray therapy. Two patients had undergone emasculation and total amputation of the penis with bilateral groin dissection.

Carcinoma of the penis is rare among males who have been circumcised at birth. None of this group of 139 patients had been circumcised in infancy. It was noted that the incidence of venereal diseases had been higher in this group than in the general population, but it is difficult to attribute etiological significance to this finding. The marital status was not found to be a causative factor. Irritation, trauma, injury, and chronic inflammation seemed to have a definite etiological bearing. In both white and negro patients, the highest incidence occurred between the ages of 45 and 49.

The papillary type of tumor predominated over the infiltrating type in this series. The sites of origin were found to be (1) the prepuce and frenum, (2) the glans, and (3) the coronal sulcus. Metastatic spread is by way of the penile lymphatics which, with those of the scrotum, lower abdomen, and thighs, are part of one system draining into the inguinal and femoral lymph nodes. In this series, 54 patients had no involvement of the lymph nodes, 37 had bilateral involvement, while 11 had unilateral lymph node involvement. Inguinal node metastases appeared to depend primarily upon the degree of malignancy of the primary lesion and not upon the duration or the extent of involvement of the penis by the carcinoma.

There are no symptoms pathognomonic of cancer of the penis. The disease is treated by radiotherapy or surgery or a combination of these methods. A lesion 2 cm. or less and not involving Buck's fascia is treated entirely by radiation. Radiotherapy is also indicated for preoperative irradiation preliminary to surgical intervention and for palliation. Preoperative irradiation is not given to metastatic inguinal nodes because it is ineffective in clinically arresting the disease. Postoperative irradiation of the groins is effective in decreasing the incidence of recurrence and for palliation.

Adequate preoperative and postoperative care is essential. Spinal anesthesia, combined in some instances with sodium pentothal given intravenously, was the anesthetic of choice in this series. Simple or partial amputation was performed on 45 patients, with bilateral groin dissection either at the same time or at a later date, according to the general physical condition of the patient. Total or complete amputation was performed on 10 patients who had extensive involvement of the penis but no involvement of the regional lymphatics. The urethra was brought out through the perineal body in preference to leaving it in the upper portion of the scrotum. Partial amputation with bilateral groin dissection was performed on 6 patients. Total amputation with bilateral groin dissection was performed in 13 cases in which the entire organ as well as the regional lymphatics were extensively involved. Emas-

culation with bilateral groin dissection was performed on 8 patients.

Irradiation alone was given to 53 patients and of these, 62 per cent are alive. Major surgical procedures were performed on 82 patients and of these, 42.7 per cent are alive.

A plea is made for early biopsy of all suspicious penile lesions. CLARENCE V. HODGES, M.D.

GENITAL ORGANS

Pearse, R., and Meyer, E. G.: Cancer of the Prostate. *Canad. M. Ass. J.*, 1946, 55: 441.

Cancer of the prostate ranks third in frequency, being surpassed only by cutaneous and gastrointestinal carcinomas. Malignancy usually arises in the posterior lobe of the prostate gland far away from the urethra, hence the lack of early symptoms; but this anatomic position makes it susceptible to early detection by digital palpation through the rectum (Fig. 1).

A small hard prostatic nodule with ill defined margins felt digitally on rectal examination should arouse grave suspicion. Such a nodule may be an early carcinoma and should be differentiated from a fibrous nodule resulting from chronic prostatitis or prostatic calculi. The patient should be observed for a while during which time the serum acid and alkaline phosphatase is estimated. In case of doubt the patient should be hospitalized and prepared as for a perineal prostatectomy. The prostate gland is exposed by the perineal route, the nodule excised, and biopsy performed. If cancer cells are found a radical prostatovesiculectomy is performed.

When cancer is coexistent with adenomyoma the problem of diagnosis becomes more difficult. It should be remembered that the cancer is not situated in the adenomyoma but in the thinned out prostate which forms the so-called false capsule of the larger benign tumor and will not be removed by suprapubic enucleation, which is commonly but erroneously called prostatectomy (Fig. 2). Such cases should be treated by radical perineal operation as these patients have good prospects of cure.

The majority of patients present themselves for treatment late in the course of the disease when they experience symptoms of urinary obstruction or metastases, or both; there is no known cure for such a patient. However, strikingly beneficial results follow bilateral orchiectomy performed on patients with urinary obstruction and pain from metastatic foci. The pain disappears in from 24 to 36 hours, and the patient may void more freely within a week. Roentgenograms of osseous metastases will show a return to more normal bone structure in 2 to 3 months. The serum acid phosphatase, which is usually elevated, drops toward a normal level, and the alkaline phosphatase shows an initial further rise and then a slower recession. Many cases, however, require transurethral resection in spite of orchiectomy. The same chain of events may occur when similar patients are treated with estrogens. The results of orchiectomy and/or estrogen therapy are not lasting; relapses may occur.

Fig. 1

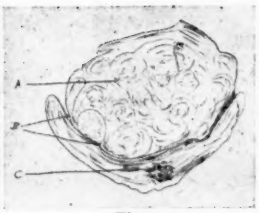


Fig. 2

Fig. 1 (Pearse and Meyer). Diagram showing site of early cancer, adjacent to rectum remote from urethra.

Fig. 2. Diagram showing adenomyoma (*A*); nodule of cancer in thinned out prostate gland (*C*); and line of cleavage followed by the finger when suprapubic enucleation is done (*B*).

It is not known why relapse occurs. It is postulated that since androgens are produced in the testes and adrenal glands, the adrenals acquire a compensatory androgen activity following orchiectomy and thereby reactivate the cancer. The combined treatment by orchiectomy and with estrogen does not achieve better results than either type alone.

Estrogen therapy renders the patient less miserable and apparently prolongs life. This is considered the best palliative treatment. Whether orchiectomy is to be preferred to estrogen therapy is a matter of further research. In performing an orchiectomy it is necessary only to remove the bodies of both testes and replace the cords and epididymes in the scrotum. The epididymes are saved because they are not concerned in the production of androgens. Also, the presence of something in the scrotum pleases the patients. In 3 or 4 months the epididymes atrophy but by that time the patient is already reconciled and psychologically adjusted.

Orchiectomy can be done through a small (1 inch) incision over each external inguinal ring.

ROBERT TURELL, M.D.

Biasini, A.: Two Cases of Seminoma in the Inverted Testicle (Due casi di seminoma in testicolo invertito). *Arch. ital. urol.*, 1943, 20: 236.

The author reports 2 cases of seminoma of the testis with inversion. He precedes the report with a discussion of primary tumors of the testicle, in which he observes that such tumors (1) are rare; and (2) may be classified as epithelial tumors, connective tissue tumors, mixed tumors, and teratomas.

The seminomas, he continues, are to be found in the testis and in the ovary, may be small in size, not to exceed 100 gm., or they may weigh up to 500 gm. The cut surface of the smaller ones shows a neoplastic mass subdivided in lobules by connective tissue, and in the large ones the cut surface may be studded with areas of hemorrhage and necrosis. The tunica albuginea is usually smooth in both, and if invaded by the neoplasm it will ulcerate and cause a fungating neoplasm. A hydrocele is always present.

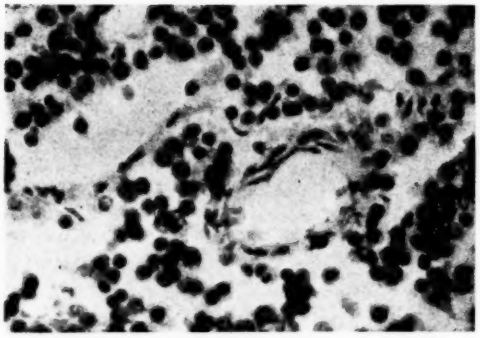


Fig. 1 (Biasini). Seminoma of the testicle. Intimate contact of the neoplastic elements with the dilated capillaries.

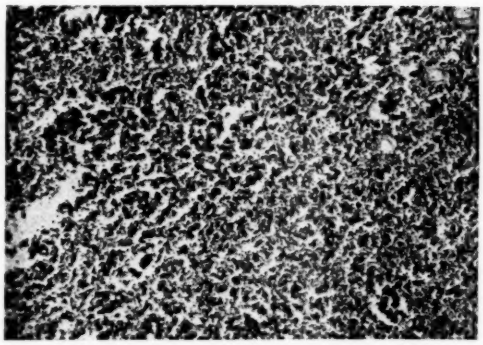


Fig. 2. Microscopic view of seminoma with low power.

A detailed histological description of the tumor follows. The neoplastic mass has fine fibrillary septa surrounding the individual cells, and a more abundant connective tissue stroma which causes distinct lobulation and tubular forms with transition of one into the other. The cells themselves may be round or polygonal. The cytoplasm is scanty. The nuclei may be round or oval and the mitotic figures numerous. A silver impregnating stain reveals a fine fibrillary stroma, part of a more massive one which makes the scaffold for the cell nests. Areas of hemorrhage, necrosis, and lymphocytic infiltration are present. The neoplastic tissue invades, compresses, and destroys the parenchyma of the testis.

Because some of the cells resemble spermatocytes, the tumor is classified as carcinoma by some, and because of the presence of fine fibrillary network it is considered sarcoma by others. The presence of this fibrillary scaffold which embraces practically every cell has been clearly and irrevocably demonstrated by Ceccarelli and Perrera with the Bielchowski-Weigert stain. This is in contradiction to some authors who would ascribe the presence of this fibrillary network due to stains.

LaManna has proved without doubt the presence of these fibrillae surrounding the acini and the individual cells, and therefore concludes that "seminomas must be considered sarcomas." He also cites the radiosensitivity of the tumors, which is similar to that of sarcomas, as stated by Porchownick, Auburg, and Mezzakawa. A discussion as to the origin of such tumors (seminoma) is then given. Most authors ascribe its origin to a proliferative perversion of the different elements which constitute the testis. Etiologically, trauma is given as a first cause, and LaManna ascribes the origin of the tumor to repeated surgical interventions for hernia and hydrocele. Ectopia and hypoplasia make the tumor more common on the right side. It usually occurs before the twentieth year of age.

The tumor is of slow growth, decreases sexual potency, causes a feeling of heaviness in the erect position, but no constitutional disturbances. The growth of the tumor may displace the root of the penis. The testis is hard, smooth, mobile, and slightly painful. The epididymis is usually normal, but indurated at times. The cord is normal and the hydrocele usually contains blood tinged fluid. The inguinal lymph glands are invaded on both sides, become adherent to the skin early, and soon the iliac, retrocolic, and lumboaortic nodes are invaded. In the diagnosis, x-ray study is of importance as it may reveal metastases or a modification of the normal contour of the involved organs proximal to the suspected growth.

The Ashheim-Zondeck test is always positive in malignant tumors of the genitalia and becomes negative after the removal of the tumor. The test is positive in the presence of metastases. A thorough examination of the fluid withdrawn from the hydrocele must be made.

The prognosis is poor. A seminoma of the testis not removed is always fatal; therefore early diagnosis and early surgical removal are necessary. Removal of the testicle must include removal of the cord and the lymphatic glands up to the renal pedicle. (According to Chevassu, from the nodes around the renal pedicle the drainage is toward the mediastinum, root of the lungs, and supraclavicular gland). Metastases occur at an early age, and have been found in the mediastinum, lungs, and vertebral column.

Occasionally, x-ray therapy before and after surgery may be helpful, but it is to be remembered that the tumor is exquisitely malignant, and that it is refractive to surgical as well as roentgenological treatment.

The author reports 2 cases of seminoma with the didymis-epididymus apparatus in anterior inversion. He states that the inversion may be anterior, vertical, horizontal, or lateral, and concludes that the anomalous orientation of the gland along with trauma may be the cause of the neoplasm.

JOSEPH M. A. PAPE, M.D.

MISCELLANEOUS

Robinson, J. N., Culp, O. S., Suby, H. I., Reiser, C. W., and Mullenix, R. B.: Injuries to the Genitourinary Tract in the European Theater of Operation. *J. Urol.*, Balt., 1946, 56: 498.

Cross section groups of patients with injuries to the urinary tract have been studied in as much detail as the available records permit.

High explosive shell fragments were the most common missiles encountered in 100 cases of ruptured urethra; the anterior urethra was injured most frequently, and the bulbous segment was the most common site of the injury. It is apparent that the treatment of choice is (a) early restoration of urethral continuity and (b) adequate urinary drainage. Very small defects may be managed satisfactorily in a variety of ways, but in the authors' cases, larger injuries did best when treated with suprapubic cystostomy, a splinting urethral catheter, and some type of surgical approximation of the damaged tissue. No deaths occurred in this group and 52 per cent of the patients resumed duty in the European theater of operation.

Of 100 perforating wounds of the bladder, 50 were extraperitoneal defects, 30 were located intraperitoneally, and 20 had both extra- and intraperitoneal involvement. Shell fragments and bullets were responsible for most of these. Seventy-one per cent also had injuries to other systems, usually perforation of the intestines or fracture of the pelvis. All were treated eventually by suprapubic cystostomy. In 81 cases which were recognized promptly, the average time between injury and operation was 9.3 hours. Drainage of the peritoneal cavity was unnecessary and repair of the bladder defect seemed to hasten recovery but was not essential. Treatment by indwelling urethral catheter alone proved unsatisfactory. Two deaths occurred in this entire group. One patient whose condition was not diagnosed and treated until after evacuation developed peritonitis; the other died of pneumonia. Eighty per cent recovered promptly while still in the ETO. Early cystostomy proved to be the most important single factor in the treatment of these patients.

Twenty-five wounds of the ureter were studied. The lower third was injured most frequently and complete division was more common than partial severance. Only 2 patients failed to have injury to other organs, usually the intestinal tract. Only one-fourth of the patients were diagnosed at the initial operation. Early diagnosis is imperative and may be possible only after pyelography. Proper treatment depends upon whether the defect is partial or complete. In partial rupture, although the anatomical closure of the ureteral tear is desirable, extraperitoneal drainage and/or indwelling ureteral catheters often are adequate. In cases of complete division, however, end-to-end anastomosis over a splinting catheter with diversion of the urine is the operation of choice. One death occurred in this group of 25 patients and this was due to peritonitis following unsuccessful repair of an associated intestinal injury. Nephrectomy should be confied to cases with massive loss of ureteral tissue and to complete failures after more conservative surgery.

Twenty-five "blast" syndrome kidneys recovered without surgical intervention despite secondary hemorrhages in 2 cases. Only 2 patients failed to resume duty in the theater and these were evacuated to the United States with thrombophlebitis and lung abscess, respectively. The urinary tracts were normal.

Seventy-five gunshot or shell fragment wounds of the kidney were studied. Seventy per cent also had wounds of other important structures, with the chest predominating. Sixteen had nephrectomy at the original operation and 8 required nephrectomy after evacuation to the rear. The remaining 51 had only conservative surgery. Two patients died, 1 from peritonitis due to necrosis of the colon and the other from secondary hemorrhage following nephrectomy. Seventy-five per cent of the patients returned to duty in the ETO. Only when there is uncontrollable hemorrhage, evidence of increasing urinary extravasation, massive destruction or extensive infarction of the kidney is surgical intervention indicated. Operative treatment usually can be conservative, with foreign body removal, suture or packing of the kidney and perirenal drainage as the operation of choice. Occasionally it will be obvious that nephrectomy is necessary.

Sulfonamides and penicillin were used almost routinely in all of these injuries to the urinary tract. They seemed to prolong the safe interval prior to initial treatment and lessen postoperative complications. Transfusions of plasma and whole blood were employed frequently and undoubtedly influenced the clinical courses and end-results.

JOHN A. LOEF, M.D.

Hanley, H. G.: The Female Urethra and Its Relation to Upper Urinary Tract Infections. *Proc. R. Soc. M.*, Lond., 1946, 39: 741.

Hanley reports a study of 433 women in an attempt to demonstrate the close relationship between urethral inflammation and upper urinary tract infection in women of the childbearing age. In addition to a general and gynecological examination, a full urological examination was made in every case.

Over half of the women attending the author's clinic have symptoms directly referable to the urethra, such as frequency, urgency, and dysuria. He contends that true cystitis is a relatively rare condition compared with the urethrotrigonitis which really causes these symptoms. A nonpurulent urethritis associated with normal urine is the underlying disease. The trigone is frequently affected also. The onset is generally acute, there may be acute exacerbations, and the condition may progress to a typical pyelitis.

Fifty-four per cent of the women in this pyelitis group had a history of preceding urethrotrigonitis. In acute urethrotrigonitis the onset is sudden, severe urgency and dysuria are present, and only a few

drops of urine are passed at a time. Terminal hematuria is common. Occasionally, dysuria without frequency is observed. There are marked constitutional effects. Usually the symptoms subside in a week. During the acute stage the urine may contain pus, red cells, and the Bacillus coli, but the urine quickly clears. Inflammation of the trigone and urethra is present cystoscopically.

A high proportion of cases settle down into a state of chronic urethral irritability, punctuated by acute exacerbations for months or years. Morning frequency and dysuria are present, associated with urgency, incomplete bladder emptying, suprapubic pressure, and terminal hematuria. There frequently is referred pain to the loin, groin, thigh, and suprapubic region, probably caused by an associated ureteritis. In some cases the histories went back from 8 to 10 years.

Only 3 per cent of the group gave a history of previous abortion. Normal childbirth did not seem to be important etiologically. There was a surprisingly low incidence of accompanying pelvic disease other than cervical erosion. The urine is usually crystal clear. The urethral orifice is frequently edematous and hyperemic. Narrowing of the urethral lumen was one of the commonest findings. Cystoscopy demonstrated a normal pink-yellow mucosa, but a localized trigonitis, always accompanied by a similar or worse degree of pathology in the urethra, was present. At the margin of the internal urethral orifice are evident edematous, translucent, pedunculated, or sessile polyps and large congested vessels. These are best seen with a foreoblique telescope or a urethroscope. The polyps appear singly or in clusters, usually between 10 and 2 o'clock, and may be solid, pedunculated, translucent, or in rigid hillocks. These hyperplastic changes are found so often in association with the symptoms of frequency and dysuria that there can be little doubt that they are part of the syndrome.

Because of the argument that these urethral findings are so common as to be of no significance, a control series of 70 women of the same age group who had never at any time complained of abnormalities of micturition was examined. Urethral polyps and hillocks were present in only 5 of the 70 controls but all of these 5 had had abortions or salpingitis. These figures suggest that urethral polyps are rare in a previously uninfected urethra. As to the mode of infection, the first symptoms date from the time of marriage in so many cases that there is no doubt that the sexual organs are closely bound up with the etiology of the condition.

In 80 per cent of the women the first onset of urethral symptoms developed within 3 months of marriage. Not only defloration but coitus after a prolonged interval may precipitate an attack. In the majority of cases the primary acute infection is a direct ascending infection from the vulva.

The author believes that the evidence in favor of a blood-borne infection in pyelitis is not convincing and he considers ascending infection up the periureteral areolar tissue an important consideration. In periureteritis there is dull, almost continuous pain in one or both iliac fossae and groins, mild spasms of colic which are made worse or better by the onset of menstruation. The passage of a ureteral catheter may produce a dramatic cure, and frequently mere urethral dilatation suffices.

DAVID ROSENBLOOM, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Murray, R. C., Kirkpatrick, H. J. R., and Forrai, E.: A Case of Albright's Syndrome (Osteitis Fibrosa Disseminata). *Brit. J. Surg.*, 1946, 34: 48.

Albright's syndrome is characterized by unilateral multiple cystic bone lesions, by brown nonelevated pigmented areas of the skin which tend to be on the same side as the bone lesions, by endocrine dysfunction associated with precocious puberty, and by the beginning of the disease in the early years of life.

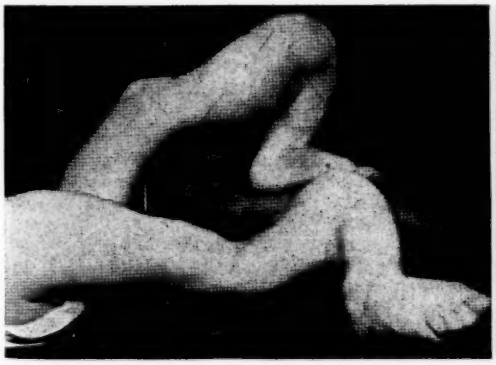
Generalized osteitis fibrosa cystica (von Recklinghausen's disease) is very similar to Albright's disease and is caused by an excessive secretion of parathyroid hormone usually associated with adenoma of the parathyroid glands. In Recklinghausen's disease generalized osteoporosis with foci of osteitis fibrosa is the predominant finding. There is also a high serum calcium and plasma phosphatase, a low plasma inorganic phosphorus, and an excessive excretion of calcium by the kidneys.

In Albright's disease generalized osteoporosis is absent. The bone lesions are spotty and there is normal bone between the lesions. The plasma calcium and plasma inorganic phosphorus usually are normal. Blood phosphatase is elevated only in advanced cases. The urinary output of calcium is not increased. In female patients there is precocious puberty and early union of the epiphyses.

Some cases exhibit only one or two of the principal three symptoms of Albright's disease. Very often the disease occurs in a mild form without any extraskeletal symptoms. The bone lesions are regularly but not exclusively found in Albright's disease.

At the site of the bone lesions the cortex is extremely narrowed, and the normal structure of the bone is replaced by irregular, imperfectly calcified osteoid tissue. The outer surface of the cortex is covered by a layer of fibrous tissue. The Haversian canals are widened because of increased osteoblast-osteoclast activity. The deeper portions of the bone are replaced by a matrix consisting of closely packed spindle shaped cells, small foci of osteoid tissue, giant cells and irregular trabeculae. In some areas, depending on the activity of the process, some more mature fibroblasts are seen. There are many thin walled vessels and there is evidence of recent hemorrhages.

A detailed account is given of a patient 25 years old who was afflicted with Albright's disease. The childbirth was uneventful and the child appeared normal except for a large birthmark. The parents, sisters, and brothers showed no evidence of any deformity. At the age of 4 the child was noticed to be knock-kneed. At the age of 9, medical aid was sought because of deformity of the lower extremities. The upper ends of the tibiae were enlarged and nodular. A wedge osteotomy of the left tibia and fibula was performed and healed normally. A year later the child sustained a fracture of the femur which healed satisfactorily. This patient was seen again at the age of 22. The deformities of the lower extremities were described as "grotesque" by the examining physician (Figs. 1 and 2). There was some clubbing of the left ring and middle fingers. A very large area of brown, pigmented skin covering the left side of the body was also noticed. The heart was enlarged. The electrocardiogram showed inversion of the P_4 and a slight tendency toward right axis deviation. No abnormality of the reproductive system was noticed. Roentgenograms of the entire skeleton revealed lesions in many areas of the bones of the legs, pelvis, spine, ribs, and upper extremities.



Figs. 1 and 2. (Murray et al). Photographs showing the condition of the lower limbs on admission.

The laboratory findings were normal except that the serum phosphatase showed 80 King-Armstrong units and there was a trace of Bence-Jones proteose in the urine on 7 occasions.

The patient had four osteotomies on the tibiae and fibulae, and both femora. The object was to bring the legs in general alignment with the hips. Two years after treatment was initiated he was able to walk with seat-bearing, corset-topped calipers.

Treatment of the general condition with the object of restoring the bone to normal is usually not successful. X-ray therapy of the bone lesions and the pituitary gland did not prove successful. Helfet reported considerable success in treating generalized fibrocystic disease of bone, unassociated with parathyroid adenoma, with aluminum acetate or gluconate with the object of precipitating part of the phosphate in the bowels to prevent its absorption. Activity of the parathyroid gland is stimulated by the blood phosphates.

Various theories were cited to explain the etiology of Albright's disease. Albright advanced the theory that the symptoms are based on embryological defects. Lichtenstein and Jaffe believe that the disease has its origin in the perverted activity of the bone-forming mesenchyme. Steinberg and Joseph believe that the cause lies in faulty development. Others suggest that the disease is the result of endocrine disturbances. Burrows attributes changes of the blood vessel walls to be responsible for the localization of the foci in the bones, skin, and parathyroid glands.

GEORGE I. REISS, M.D.

Caffey, J.: Infantile Cortical Hyperostoses. *J. Pediat.*, S. Louis, 1946, 29: 541.

The author reports 10 cases of cortical thickening of the skeletal system in children. His first case was observed in 1938. Three similar cases were encountered in 1939, 1940, 1944, respectively. The present communication pertains to a detailed study of 6 additional cases which the author has studied in collaboration with other clinicians.

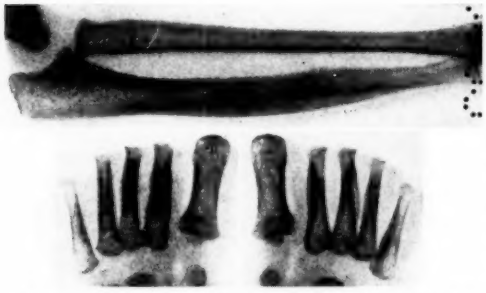
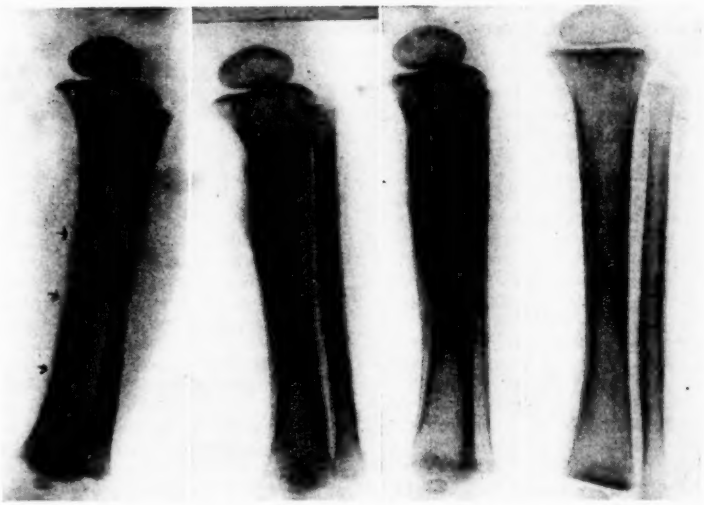


Fig. 1. (Caffey) Top, Lamellated thickening of the cortex of the right ulna. Left lower, Symmetrical cortical thickenings in the second, third, fourth, and fifth metatarsals of both feet. The first metatarsals, in contrast, are not involved. The phalanges were normal.

Fig. 2. (Caffey) Top, Long, thick hyperostosis in the left ulna. The ulnar side of the radius is also slightly thickened. Bottom, Symmetrical hyperostoses in the fifth metatarsals. There is also some cortical thickening on the medial side of the second left metatarsal.

All of the patients exhibited the following trilogy: (1) tender swelling deep in the soft tissues, (2) cortical thickenings in the skeleton, and (3) onset during the first 3 months of life. There was a distinct uniformity of cortical hyperplasia under a proliferating periosteum. Bony predilection is unpredictable. Infantile cortical hyperostoses were demonstrable roentgenologically in the mandible, clavicles, scapulas, ribs, skull, and the tubular bones of the extremities. Soft tissue swellings were deep, firm, nonfluctuant, noninflammatory, and not particularly superimposed upon the bony hyperplasia in all instances.

Other less uniform manifestations were fever, pleurisy, anemia, and an increased sedimentation rate. After a variable period of weeks, and in some cases months, all patients recovered without any residual morbidity. Prolonged clinical investigation has not elicited the causative agency of this unusual entity. It is further noted that this disorder is a self limited disease, for which there appears to be no specific treatment. Eight of the 10 patients, whose onset of the disease flourished at or under the age of 6 months, exhibited facial swellings. All except 1 disclosed mandibular hyperostoses. Cortical thickening of the metatarsal bones was noted in the older group of patients. Pain was also felt by this group, particularly at the onset, and therefore they refused



a b c d

Fig. 3. (Caffey) Progressive changes in the left tibia and fibula from the third to the fourteenth week after onset. a, Three weeks after onset the medial side of the tibia is covered with a faint, short, thin strip of water density (arrows). b, Five weeks after onset the tibia and fibula are surrounded by long, thick, sclerotic envelopes of calcium density. c, Eight weeks after onset the cortical thickenings have increased in depth and density. The medial surface of the hyperostosis is now rough. d, Fourteen weeks after onset the hyperostoses are shrunken in comparison with earlier findings. The absence of metaphyseal and epiphyseal changes suggestive of scurvy at all stages is noteworthy. There is a striking absence of transverse lines in these last films.

to walk. It is Caffey's opinion that walking and weight bearing may yield traumatic possibilities to the pathogenesis of infantile cortical hyperostoses.

Repeated x-ray examination of the susceptible bones may avert confusing the bone thickening with parotitis, neoplasm, and osteomyelitis of the mandible. The painful pseudoparalysis of the extremities may be confused with scury. Fever, painful extremities, and hyperirritability may be masquerading poliomyelitis. Anemia, fever, and bone pain may simulate infantile leucemia, rheumatoid arthritis, and rheumatic fever. The components of the syndrome common to all patients are deep swellings of the soft tissues, and cortical hyperostoses in the neighboring bones.

SAMUEL L. GOVERNALE, M.D.

Stack, J. K., and Hunt, W. S.: Radiohumeral Synovitis. *Q. Bull. Northwest. Univ. M. School,* 1946, 20: 394.

The term "tennis elbow" as used to diagnose pain and disability in the posterolateral aspect of the elbow is inexact. It fails to differentiate extra- and intra-articular lesions of the radiohumeral joint. Disorders of the radiohumeral joint usually come under observation in from 1 week to 6 years after the onset; they are caused by a trivial injury, or by an unusual exertion. The symptoms are tenderness and pain in the posterolateral aspect of the elbow, and often a grinding sensation on pronation and supination of the forearm. Very often there is radiation of pain along the extensor surface of the forearm. There is weakness in the grip to the extent that the patients inadvertently drop objects, and many patients are unable to perform the finer movements of the hand, i.e., buttoning of the collar button, knitting, etc.

Examination usually reveals tenderness over the posterolateral aspect of the elbow. The patient is able to lift heavy objects when the forearm is kept in supination, but is unable to perform the same task if the arm is pronated. Often a grating sensation is palpable or even audible in the area of the radiohumeral joint on pronation and supination of the forearm. Rarely, a slight fullness is found over the lateral aspect of the radiohumeral joint.

There are several pathological entities which may be responsible for these symptoms. The most common lesion is an incomplete tear of the origin of the common extensor muscles, associated with underlying periostitis. Sometimes the periostitis reaches proportions to be discovered only on x-ray examination, and it is then diagnosed as epicondylitis ("epicondylalgia" by the older writers).

The existence of a radiohumeral bursa is questioned by many workers. Some authors have found bursitis to be the etiological factor in these conditions (as demonstrated in dissected cadavers). In some cases a pea-sized mass of granular, areolar tissue and fat is found to lie deep in the conjoined tendon, and externally but exactly over the capsule of the radiohumeral joint. Curetting away of this so-called bursal mass relieves the symptoms.

The intra-articular lesion might be caused by repeated pinching of the redundant synovial membrane, followed by hyperemia and subsequent thickening and villous formation. Another intra-articular lesion may be caused by fraying of the orbicular ligament or the coronary ligament.

Most of the complaints will clear up without treatment of any kind if the particular movement causing the pain is avoided. One author reported that the condition may exist for a period of 20 years.

Conservative treatment consisting of sling immobilization, heat in the form of packs or diathermy, or plaster immobilization is recommended. The majority of patients will get well. Patients who do not recover after a reasonable period of time are suspected of having intra-articular lesions, and surgery is recommended. The surgical incision is the same as that used for the approach to the head of the radius. The radiohumeral joint is incised and the offending tissue is removed. Four patients in whom conservative treatment failed were operated on by the author. GEORGE I. REISS, M.D.

Sutro, C. J.: Para-Articular Ossification of the Soft Parts of the Ankle; Complication of the Sprain with or without Fracture of the Shaft of the Ipsilateral Fibula. *Arch. Surg.*, 1946, 53: 441.

A thin plaque of increased density in the region of the inferior transverse or posterior ligaments of the ankle was noted in 3 of 45 sprained ankles reported in this article. The 3 patients had unusually long convalescences, suffering recurrent pain and swelling for the duration of the follow-up period (4 to 7 months), while the other 42 patients recovered in from 4 to 6 weeks. In 3 other patients who sought treatment for recurrent pain and swelling of an ankle which had been sprained 2 to 3 years previously similar densities were noted in the roentgenograms. The densities were also noted in 2 patients who had sustained fractures of the shaft of the fibula as well as a sprain of the ankle, and in whom the recovery from the sprain was prolonged and more troublesome than the fracture.

The author believes that the density is due to ossification and not calcification of the connective tissue. The bone is not new periosteal bone. The basis for the recurrent swelling of the ankle may be due to inflammation or irritation of the synovial surfaces by the ossification of the para-articular tissues.

The treatment given all the patients with this complication of ankle sprain consisted of assignment to duties not requiring excessive walking, the application of elastic supports to the ankle, and repeated courses of hydrotherapy. This resulted in partial resolution of the swelling and pain, but did not cause the disappearance of the densities in the soft parts. No surgical correction was attempted.

The author believes that this condition is similar to the ossification of the tibial collateral ligament of the knee. NEWTON C. MEAD, M.D.

Agati, D.: Circumscribed Osteochondritis of the Astragalus (Osteocondrolisi circoscritta dell'astragalo). *Radiol. med.*, Milano, 1946, 32: 202.

The author cites 2 personal cases of osteochondritis dissecans (circumscribed osteochondrosis) of the astragalus and 13 other cases found in the literature.

He finds that males and persons in the younger age group, from 20 to 30 years, are afflicted more often than females and those of other ages, and feels that in older groups arthritic characteristics may mask the initial osteochondritic focus. He finds that there is also a preferential site for the lesion in the astragalus just as there is in the knee, elbow, and hip, and that this is usually the medial side of the trochlea of the astragalus (11 cases of 15). As in the other locations, he feels that the cause is due to predisposing anatomic and functional factors and conditions of trophic unsteadiness from a vascular deficit. In the astragalus the greater weight coming to bear heavily on the trochlea of the talus is an important factor.

Agati found that in the majority of cases the occasional trauma which determined a recrudescence of the syndrome and which consequently brought the patient to roentgenological examination was of minor importance, and that the disturbances, even though slight, antedated the trauma. The trauma, therefore, more than the direct causal agent of the disease, seems to be the aggravating factor and the revealer of a latent pathological state. Therefore, he believes that there can be silent lesions of osteochondritis that are never diagnosed.

From the clinical point of view he notes that this lesion has a variable course—it is possible for it to end in a spontaneous and complete cure or maintain itself unmodified for months or years. The subjective symptoms are usually limited to moderate local pain which is often interpreted as dependent on arthritic factors or ascertained roentgenologically in other cases. The swelling is not constant and appears usually after the revealing trauma of the disease—usually in part or all around the ankle so that one suspects a sprain or tries to exclude a fracture.

The x-ray findings are comparable to those observed in other articular sites. The author describes these findings and cites an example in which the osteochondritic mass seemed to be mobilized free in the joint, but at operation was found not to be free; therefore he gives a warning regarding operative interference.

Regarding therapy, he offers a word of caution in keeping all the evidence in mind. Therapy may be surgical when locking phenomenon or limitations of

joint movement are found—one must be certain of the existence of an endoarterial mobile mass. Therapy may be conservative (rest, immobilization, physical therapy) when a joint mouse cannot be recognized even after pneumarthrography. Regarding the astragalus, there has not been observed a mobilization of the isolated piece; therefore, the conservative method is the best treatment.

The author describes the roentgenological differential diagnosis and concludes by saying that up to now osteochondritic lesions of the astragalus have all been found on the trochlea.

G. Albin Liva, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Morris, H. D.: Tenon and Mortise Grafts for Bridging Metacarpal Defects Due to Gunshot Wounds. *Surgery*, 1946, 20: 364.

A method for bridging defects in the metacarpal bones due to gunshot injuries is presented. The method is applicable when damage to the nerves and tendons is minimal and when loss of substance and continuity of the bone results in deformity and disability.

The procedure is to resect the distal and proximal fragments until a transverse cortical surface can be obtained. The fragments are then reamed out and a cortical tibial bone graft of sufficient length and a tendon 1.5 cm. long on either end is then used to bridge the gap. The graft can be more easily placed if a slot is cut in the distal fragment and the tenon held in place with a wire loop. If necessary the graft may be seated into one of the distal carpal bones. Immobilization is maintained for 8 weeks, after which time union will be complete.

Vernon C. Turner, M.D.

Tavernier, L.: The Treatment of Chronic Congenital Dislocation of the Hip (Le traitement des luxations congénitales invétérées de la hanche). *Rev. orthop.*, Par., 1946, 32: 109.

A considerable number of congenital dislocations of the hip still fail to get orthopedic treatment in infancy. The majority of these patients come to the orthopedic surgeon at a time when arthritis of the hip has made their condition intolerable.

Many surgeons have developed a definite technique in the treatment of these conditions and adhere to it. Most French surgeons are satisfied with palliative surgery, i.e., subtrochanteric osteotomy; foreign surgeons perform reconstruction operations. Other surgeons adapt the procedure to each individual case.

The author has done most of the operations recommended during the last 20 years. In the last few years an "enervation" operation of the hip joint was done associated with other procedures or alone in cases in which pain and not lameness was the outstanding complaint. On consolidation of the experiences thus gained a certain procedure was developed which proved to be very satisfactory in the treatment of congenital dislocation of the hip, and the following operations were completely abandoned: resection of the femoral head, arthrodesis of the hip, and the operation of Zahradnicek. The following operative procedures: reconstructive arthroplasty, "shelf" operations, subtrochanteric osteotomy and "enervation" of the hip, deserve further discussion. Nové-Josserand has resected the femoral head in old patients who had intolerable pain. The author did this procedure once and found that it relieved the pain a great deal but resulted in a very unstable hip; in fact, the hip was much worse than prior to the operation. This procedure should be done only in cases in which there is a decalcified head which has resisted all attempts at reduction. A secondary stabilizing operation is necessary, i.e., a shelf operation or subtrochanteric osteotomy. In this group only 1 arthrodesis of the hip was done in an old patient who had an old painful unilateral dislocation with good result. There were unusual circumstances in this case because ordinarily one tries to obtain a better result than a fused hip. However, this operation should be kept in mind as a reliable procedure which can be used if other procedures fail.

The Zahradnicek operation (open reduction, shelf operation, and shortening of the femur) was done in a few patients. With the exception of a few good results, most of them were unsatisfactory, and after a patient died due to shock at operation this procedure was completely abandoned.

Arthroplastic operations of the hip joint are sound but have the disadvantage of being difficult and major operations. The difficulty lies in the reduction of a fixed head due to periarticular adhesions and in maintenance of the reduction once it has been accomplished. This operation was done in 14 cases. It consists in forceful traction of the leg with the use of the Kirschner wire 2 weeks prior to the operation, freeing of the upper end of the femur at the operation, resection of the capsule, reshaping of the femoral head to fit the new acetabulum above the old one at a level where the head can be reduced and maintained comfortably, and interposition of fascia lata. The result was very good in 3 cases. The hip was stable and motion was satisfactory; the shortening was negligible. In 7 cases the result was good. There was a solid hip with diminished motion. One of these cases terminated in an ankylosis with good function. One patient had an excellent joint postoperatively as far as stability and flexibility were concerned but there was considerable pain. A second "enervation" operation on the hip joint alleviated the pain completely. Two patients had fair results. The hip was solid and not painful but there was a considerable limp. Two patients had poor results. The hips became dislocated as soon as they were taken out of plaster and reoperation was necessary. Subtrochanteric osteotomy was done in both cases; in 1, muscular atrophy remained considerable in spite of a flexible hip joint and the patient's activity was restricted to walking in his home with canes.

Generally, these results can be classified as satisfactory as far as redislocation is concerned but they are disappointing as far as muscular atrophy is concerned. Even in the results classified as good, weakness of the gluteal muscles persisted which caused the patient to limp and to have a tired feeling after walking. It was interesting to find that patients with an ankylosed hip were more satisfied than the ones who underwent arthroplasty, and that they walked and danced without a limp. It is the danger of insufficient muscles which makes it difficult to recommend the arthroplasty more often.

It is much more difficult to draw definite conclusions as to the value of shelf operations. This procedure has been the main operation for old dislocation of the hip for the past 20 years. Although no one else uses shelf operations in high posterior dislocation of the hip, the author has used it in cases of this type with good results. The classical indication for the shelf operation is the locked anterior dislocation and subluxations which are very rare. In these cases the operation offers a mechanically sound solution and forms a solid roof over the "locked" femoral head. In supra-acetabular dislocation, however, satisfactory stability is present as a rule and there is only a negligible amount of lameness. It is pain that sends the patient to the orthopedic surgeon. The pain is similar to pain in deforming arthritis and does not resemble pain due to ligamentous strain observed in young patients.

The supra-acetabular dislocations are well tolerated until puberty at which time pain appears after prolonged walking and disappears after moderate rest. There is no limitation of motion except the limitation caused by pain due to ligamentous strain. In these cases a shelf operation is very successful as the pain and limp disappear. The postoperative course might be complicated by a peculiar arthritis which is transient and does not impair the final good result. It is very unusual for arthritis to occur if the shelf is constructed at a level which does not require the head to be lowered too far. One is justified in assuming that deformity and deforming arthritis will not occur in cases in which the head lies under a shelf under nearly normal mechanical conditions but would occur if not treated. On the other hand, if a patient with a supra-acetabular dislocation has reached the age of 35 or more without any serious complaints and then develops pain while at rest, limitation of movement, and abnormal posture, shelf operation is not the rational procedure. In this series shelf operations were done in these cases. Some have helped the patient but only for 1 or 2 years. This is not surprising if one realizes that this operation does not change anything but the mechanical action of the hip. Many patients did not get any benefit at all from the operation and in many the condition was actually worse after the operation. The newly constructed shelf blocked the deformed head, limiting its movement even more, and thus limiting movement in the hip joint without relieving the pain. One can readily see why the shelf operation is contraindicated in these cases and why arthroplasty or "enervation" would be the better operation.

The shelf operation was performed on female patients between 20 and 30 years old with much success. The best results were observed in some patients only after the lapse of 1 or 2 years of persistent pain. This time was necessary to permit the head to adjust itself to the shelf. Before it can be judged that the operative procedure will eventually be successful it is important to study the shape of the head very carefully. In 2 cases there was a sharp angle near the top of the head where it rested against the iliac wing. This deformity was responsible for a poor result and always is a contraindication to the shelf operation. One readily sees that the shelf operation is limited to old dislocations of the anterior type and to patients not older than 30 years.

Subtrochanteric osteotomy is the treatment most frequently used for old dislocation of the hip in France. It is a simple operation. It is done with a double angulation, one in the frontal plane to correct the adduction deformity—by stretching the muscles extending from the pelvis to the trochanter and getting pelvic support—and one in the anteroposterior plane to correct the pelvic tilt and to compensate in advance for the balance of the pelvis and the lordosis. It is a very good palliative operation which improves stability and abolishes pain in the hip. It is frequently the only operation that can be employed in severe deformities due to high posterior dislocation of the hip. The results, although satisfactory, are inconsistent. Sometimes there is considerable decrease of movement, sometimes not sufficient relief of the pain in the hip joint.

The results are much more favorable in unilateral dislocations in which a better balance of the pelvis can be achieved by forceful abduction of the femoral fragment, which also will minimize the shortening of the leg, and in which limitation of motion is not too disabling. Ten operations were done in this series; the results were very good in 8 cases, and fair in 2. In bilateral dislocations the results are less favorable. Better results were obtained in cases in which osteotomy was done on one side and a shelf operation or arthroplasty on the other (15 good results and 3 fair). The results in only 3 cases of bilateral dislocation were classified as good postoperatively. In 6 they were classified as poor because of persistent limp, stiffness of the hip, faulty gait, and persistent pain. The results on more recently operated patients confirmed these findings. Pain persisted in 4 of 9 operative patients.

Roentgenograms showing the anatomical result do not explain the persistence of pain. Osteotomies which appear roentgenographically correct often are associated with persistent pain while other osteotomies, anatomically less satisfactory, are clinically very satisfactory. In spite of this rather paradoxical fact, which is true for pain only and definitely does not apply to movement, technique of the procedure is very important. It is important in every case to determine accurately the location of the osteotomy

and the angle in the frontal and anteroposterior planes. The Mommsen technique is the best from this point of view. The projecting portion of the upper fragment maintains the position securely at a chosen degree of angulation until the wound is closed and the plaster is applied. In the determination of the angle of abduction in the frontal plane one should consider that a wider angle gives a better result since it helps to maintain the balance of the pelvis. This, of course, is possible only in unilateral dislocation of the hip. In bilateral dislocation two operations are performed, the second after a sufficiently spaced interval following the first operation. It is surprising to notice how satisfactory the result is following the first procedure and how little benefit is derived from the second operation.

From the orthopedic point of view, enervation is entirely inadequate. The fact, however, that patients consult the surgeon late because of pain and only secondarily because of lameness made the author treat these patients by enervation. This operation was done on 19 patients. At the same time 15 patients who had bony operations were observed for the same period of time as control cases.

The history of these 19 patients was surprisingly similar. They were able to get along fairly well for a number of years, the lameness not being extensive; in fact, they were able to walk more than 10 kilometers daily. One day pain occurred; first after long walks, then after shorter ones, and, finally, there was pain even at rest and especially at night. At the same time limitation of motion in the hip made itself noticeable, there was abnormal posture, and at the end of 2 or 3 years the patient became disabled. These complications usually appeared between the ages of 30 and 35. In a small group of individuals, deforming arthritis appeared sooner, at the age of 25, or later, at the age of 45. In most of them the enervation operation was followed by absence of pain. Faulty posture due to contractures or spasm of the muscles disappeared, motion was improved, and the patients were again able to walk as far as they could prior to the occurrence of pain. In 9 cases very good results were obtained, in 8 the results were fair, and in 2 there was no improvement. The 9 results were classified as very good because the pain and lameness had completely disappeared and the ability to walk had greatly improved. The patients with fair results had less pain, the pain occurred after long walks, or the pain had stopped in certain regions and occurred in others. The last case in this group was one of the first operated on and only the branches of the obturator nerve were cut. Some pain persisted but finally stopped after section of the posterior branches of the sciatic nerve.

Section of the obturator branches alone was done in the first 7 patients operated upon with good results in 1 case, fair results in 6 cases, and pain persisted in the posterior regions in 3 cases. These patients were advised to have the operation completed by having the nerve to the quadratus femoris muscle sectioned. The last 12 patients were subjected to total enervation. Eight patients had a very good result, 2 a fair result, and 2 had poor results. In comparing the older with the more recent cases one readily sees the advantage of total enervation over simple obturator enervation.

The 2 failures following the enervation operation in chronic congenital dislocation were just as puzzling as the failures of the enervation operation in deforming arthritis which occur much more frequently. Five patients in the series had bilateral dislocations and were subjected to bilateral enervation operations. There was a total of 24 operations with 2 failures, or 8 per cent. In these 2 failures the pain seemed at first to have stopped only to recur in one case after a few weeks and in the other after 7 months. Since total enervation was done the once suggested theory of an abnormal articular branch is eliminated, but the reason why this operation failed in 2 cases is not explained.

The control group of 15 patients observed during the same period of time had osseous and articular operations only. Three patients in this group underwent an enervation operation with good results in 2, and improvement in the condition in 1 patient.

The favorable results indicate how valuable the enervation operation is in the treatment of chronic congenital dislocation of the hip either alone or in association with any other basic operation on the hip.

There are 3 main considerations in determining the indication for one of the many types of operations in congenital dislocation of the hip: the type of the dislocation, whether there is unilateral or bilateral dislocation, and the age of the patient. In young patients after puberty and until from 25 to 30 years of age the following reconstructive operations are indicated—the shelf operation for anterior dislocation and arthroplasty for the posterior form. In these cases the indication is precise since function is the most important factor. Sometimes these young patients tolerate the dislocation well and are without appreciable lameness yet they desire to know what can be done for them. The answer is that operation at this time might prevent complications at a later time or the operation might not be of any benefit at all. If there is a supra-acetabular dislocation it is always better to do a shelf operation because it is less unlikely to fail than an arthroplasty. In case of unilateral dislocation an arthroplasty should be tried if the patient desires it, because if stiffness occurs, an arthrodesis can be done secondarily without handicapping the patient too much. In bilateral dislocation a shelf operation is done on the lower hip, and if the operation is successful an arthroplasty is attempted on the other side. The decision is much more difficult in cases of posterior dislocation of the hip.

In cases of high posterior dislocation which cannot be lowered by heavy skeletal traction sufficiently to allow arthroplasty, the subtrochanteric osteotomy will give good results in unilateral cases. The bilateral dislocations require further considerations; if one side responds to traction better than the other, an arthroplasty can be done if an osteotomy is done on

the other side. If both sides are high, the lordosis is severe, and adduction deformity is considerable, a bilateral osteotomy should be done. If pain is the main complaint and the patient is prepared to accept the lameness, the enervation operation is indicated even in the young patient.

In the older patient these conditions present themselves in an entirely different light. If he seeks advice in a late stage he usually has no severe lameness but the pain in the hip has become intolerable. The enervation operation has all the advantages of a simple operation with the possibility of abolishing pain and putting the patient back to a stage before the pain had limited his gait and posture and before the appearance of the deforming arthritis.

The enervation operation is for the time being a valuable, palliative, efficacious, and minor procedure in the treatment of chronic congenital dislocation of the hip either alone or in combination with other osseous procedures. GEORGE I. REISS, M.D.

FRACTURES AND DISLOCATIONS

Speed, K.: Subtrochanteric Osteotomy for Ununited Fracture of the Neck of the Femur. *Ann. Surg.*, 1946, 124: 576.

The author reviews briefly the mechanics, the pathologic changes, the technique, after treatment, and results of subtrochanteric osteotomy. Before determining the advisability of subtrochanteric osteotomy the following requirements must be met:

1. All tractions or splints and fixations (including internal fixation) must be removed.
2. Open ulcers, or decubitus ulcers near the fracture area must be healed.
3. Roentgenological examination of both hips in a posteroanterior plane and a lateral view of the fractured hip must be obtained to determine (a) the amount of absorption of the neck, (b) the presence or absence of infection or sequestra or ankylosed joint, (c) the rotation of the head fragment, and (d) the viability of the head as determined by its relative density.

If these factors are unfavorable, and if the head of the femur is completely necrotic, one of several reconstruction operations on the hip may be the best procedure, especially in patients under 60 years of age. If these conditions are found to be favorable, the patient's general condition (unless obviously moribund) his fear of follow-up care, his age, and even his weight may be discounted.

Preliminary traction on the leg by means of a sturdy steel pin inserted through the calcaneus may be helpful in marked overriding of the fractured neck. At operation manipulation on a fracture table is performed to put the fragments of the ununited neck in apposition and to hold them thus with slight abduction of the legs. The reduction at the neck of the femur is checked by roentgenograms in two axes.

Following operation a plaster-of-Paris cast is applied. Eight weeks of immobilization suffices for union.

Of 10 patients operated upon, whose ages ranged from 68 to 72 years, 1 fatality is reported.

EMIL C. ROBITSHEK, M.D.

ORTHOPEDICS IN GENERAL

Coppo, M., and Calamaro, S.: The Effect of Innervation on the Mineral Composition of Bone. New Experimental Research (Sull'influenza dell'innervazione sulla composizione minerale delle ossa. Nuove ricerche sperimentali). *Sperimentale*, 1942, 96: 503.

Coppo has for some time been studying the factors that bring about mobilization of the minerals in the bones so that they are available for use elsewhere in the body. Leriche and Policard asserted that decalcification of bone is dependent on a disturbance of the normal relationship between the composition of the blood, the activity of the circulation, the condition of the connective tissue determined by the internal secretion, and the mechanical effects of pressure. They leave entirely out of account any effect of innervation on the composition of bone, although a considerable amount of research has been done pertaining to such an effect. The question is not entirely settled, however, and there are still authorities who deny it. The various conclusions of a number of authorities are given.

For the purpose of further study of this factor the authors operated on 20 rabbits, removing a section of the sciatic nerve near its origin, and in some cases also a section of the crural nerve. The animals were divided into two groups of 10 each, those of one group being killed from 11 to 21 days after the operation and the others from 24 to 75 days after it. The normal composition of the mineral ash of the bones was determined and compared with that of the animals in the two groups. Tables are given showing the details of the results and the comparative content of ash, calcium, and phosphorus in the groups. The determinations were made on the tibia of the denervated side. It was found that in the group killed after from 11 to 21 days there was a marked decrease in ash, calcium, and phosphorus; but this decrease had been compensated for in the animals killed after from 24 to 75 days.

These experiments show conclusively that innervation has an effect on the mineral composition of bone, but there are some points still unexplained, such as the great variation in the amount of decrease of the minerals in the animals of the first group and the reasons for the compensation in the second group.

AUDREY G. MORGAN, M.D.

Sorrel, E., and Longuet, Y. J.: The Anterior Transbrachial Route in Surgical Repair of Supracondylar Fractures of the Humerus in Children (La voie transbrachiale antérieure dans la chirurgie des fractures supra-condyliennes de l'humérus chez l'enfant). *Rev. orthop.*, Par., 1946, 32: 117.

By the term "anterior transbrachial route" is meant a surgical approach to the inferior extremity

of the humerus which extends across the brachialis muscle, this muscle having usually been cut transversally at the time of a supracondylar fracture of the humerus.

It seems paradoxical to repair a fracture of the elbow by the anterior transbrachial approach. The elbow is covered anteriorly by the thickest portion of the brachialis and biceps muscles, and the radial and median nerves as well as the humeral artery and veins pass in the same area from the upper arm into the forearm.

The posterior approach with sectioning of the olecranon is excellent in adults. In children, however, it is of questionable value. A number of workers state that usually severe stiffness and, in some cases, ankylosis of the elbow joint follow. The soft tissues anterior to the elbow joint are frequently lacerated by the anteriorly projecting fragment of the diaphysis. If the posterior soft tissues are cut a considerable amount of trauma is added. Furthermore, the posterior portion of the periosteum is cut which eliminates an important barrier protecting the soft tissues from the formation of osteitis ossificans. There is also the danger of injury to the epiphysis. When the posterior approach is used the small periarticular vessels are cut. This loss of collateral circulation is liable to have serious sequelae if because of pressure of the diaphyseal fragment the humeral artery becomes thrombosed.

The posterolateral approach is to be preferred and is superior to the posterior route. The object is not to go through the supinator muscle which gives little exposure and is liable to cause partial paralysis of the radial nerve. The incision is carried posteriorly to the supinator which is detached from its insertion along the lateral aspect of the humerus. Leveuf and Godard state that this approach is the best for open reduction of supracondylar fractures in children. There are two reasons why the authors discarded this approach: (a) the muscular dissection is considerable, which leads to the formation of osteitis ossificans, and (b) it does not expose sufficiently the injured structures which lie anteriorly to the elbow joint which makes repair of these structures nearly impossible.

Most supracondylar fractures can be reduced by the closed method. There are three principal reasons which make open reduction a necessity in these cases: (1) failure of the closed method of reduction, (2) injuries to the artery, veins, and nerves, and (3) compound supracondylar fractures.

The usual position of the diaphyseal fragment is familiar to most orthopedic surgeons. The fragment is displaced anteriorly, has a sharp irregular forkshaped edge, and usually has two sharp projections on its lateral and medial borders. The fragment usually lacerates the muscles and extends to, and sometimes pierces, the skin.

In a small number of cases the skin is perforated by the diaphyseal fragment. The site of the perforation is nearly always the same, the anterior aspect of the elbow just superior to the crease. Compound fracture in itself constitutes an indication for surgical treatment. Muscular interposition nearly always explains the failure of closed reduction. The anterior muscle group in most cases is pierced by the distal end of the diaphyseal fragment. The lateral and medial edges have diverging edges which causes them to pierce the muscular tissue. In these cases manual reduction even with the help of Kirschner wire traction is futile. The upper fragment impinges also on the vessels and the nerves which pass in front of the elbow joint. These structures are compressed between the end of the upper fragment and the coronoid process. The compression usually causes paralysis of the nerves and obstruction of the humeral vessels with subsequent Volkmann's contracture. The first signs of impending danger are diminished radial pulse, swelling, cyanosis or discoloration of the hand, and diminished function of the fingers.

If reduction is accomplished within the first hours after the accident, most of the complications due to the compression of the nerves and vessels can be averted. A general anesthetic, traction by Kirschner wire, and x-ray control are necessary for closed reduction of a severe supracondylar fracture of the humerus. If 24 to 48 hours have passed before reduction can be accomplished, the changes caused by the damaged nerves and vessels usually are permanent. There is no agreement as to whether or not open reduction always is necessary in these cases. Boehler states that closed reduction is the treatment of choice and open reduction is not indicated at the beginning of the treatment. Others think that immediate open reduction is absolutely necessary. It is the authors' policy to do an open reduction if there are vascular injuries. In case of nerve injury, no immediate operative intervention is necessary because neurolysis or delayed nerve suture gives satisfactory results. If the postreduction roentgenograms are unsatisfactory, open reduction is indicated in every case. In case of injury to both nerves and vessels, immediate surgical intervention is necessary.

Since 1936 the authors have been trying to find a way to reduce the fracture and to repair the injured vessels and nerves through one and the same incision. The anterior transbrachial approach was worked out and used since that time in about 10 cases. The study of these cases has enabled the authors to form an opinion as to the proper indications, contraindications, and technique of this approach.

There are four indications for the anterior transbrachial approach: (1) supracondylar fractures of the humerus (articular fractures, i.e., intercondylar and transcondylar fractures, are excluded because this particular approach does not furnish adequate exposure), (2) supracondylar fractures of the "extension" type only in which the upper fragment lies in front of the elbow joint, (3) cases in which the anterior displacement of the diaphyseal fragment is considerable, and (4) recent fractures only. In old cases one could use this approach to do an arteriectomy, sympathectomy, neurolysis, or nerve suture. One must not use this approach, however, to excise

exuberant callus, although it may be only a few weeks old.

In the event that closed reduction fails it is better to use the posterolateral approach unless the displacement of the diaphyseal fragment is considerable and the brachialis and biceps muscles are lacerated severely.

It is important to look for signs indicating vascular compression at the preoperative examination. These signs are: edema, coldness, cyanosis of the fingers and hand, venous distention, and diminished or complete absence of arterial oscillation of the forearm, as disclosed by the Pachon apparatus. Damage to the median, radial, and ulnar nerves also should be diagnosed at this examination. Damage to the nerves is often masked by the general loss of function due to the sequelae of the fracture. Ulnar nerve injury is not definite in its symptomatology at first and the "main en griffe" does not appear until late.

At operation general anesthesia is used. A tourniquet is applied to the upper arm. A Kirschner wire is placed through the base of the olecranon close to the cortical layer. In order to protect the ulnar nerve a small incision is made over the medial aspect of the olecranon and carried down to the bone (Putti's technique). The wire is then inserted and the incision closed.

The main incision is then made on the anterior aspect of the elbow parallel to the longitudinal axis of the arm. The incision may be made in the midline or on the medial or lateral portion of the elbow, when injuries to the median or radial nerves or brachial artery, respectively, are suspected. The author uses the "bayonet" type of incision which gives excellent exposure and prevents the formation of contractures in this region. The horizontal segment of the incision lies somewhat superior to the crease and over the end of the diaphyseal fragment. The lateral side of the incision is swung upward and lies over the humeral diaphysis; the medial side of the incision is swung downward and lies over the median nerve and the brachial vessels. The aponeurosis is incised following the outline of the skin incision. The brachialis and biceps muscles show evidence of having been lacerated by the sharp edge of the diaphyseal fragment at the time of injury. The contused and necrotic portions of muscle tissue are excised. Then the nerves and vessels are explored only if there are clinical signs of possible injury to these structures. If the brachial artery and veins or nerves are found to lie taut over the humeral fragment they are carefully freed and great care is exerted to prevent further injury by the sharp bony edge.

It was found that simple freeing of the artery did not restore radial pulsation. The brachial artery remained contracted and spasmodic (arterial stupor). Sympathectomy seems to be a useless procedure in these cases. In a child from 6 to 8 years old it is a very delicate and time consuming procedure. The superficial clearing of the artery is a self deceiving procedure and has no physiological basis. The pulse returns spontaneously whether or not the brachial artery is dissected free after the fracture has been reduced.

It is important, however, to differentiate between "arterial stupor" and actual thrombosis of the brachial artery. If thrombosis of the brachial artery exists, arteriectomy is indicated. Before resection of a portion of the artery is undertaken, the surgeon should be certain that occlusion of the artery actually exists. This cannot be established with any degree of certainty in the first 48 hours, i.e., at a time when surgical exploration and open reduction is undertaken.

The dissection is carried deeper and the periosteum is split to expose the bone. The sharp edges and bony spicules are removed with a curette. The posterior portion of the fracture site is filled with a coagulated hematoma. The palpating finger easily localizes the distal fragment which is pulled upward and backward by the pull of the triceps muscle. It is very important to keep in mind that rough handling of the distal fragment might lead to disturbances of the epiphysis, which in turn might permanently limit the range of motion in the elbow joint. In reduction of the fracture the distal fragment is pulled inferiorly and anteriorly while the upper fragment is pushed in a posterior direction into its periosteal bed. Any instrument can be used for this procedure. The author used a punch designed by Collin. The elbow is held at a right angle. Any rotatory misalignment of the fragment must be corrected. Maintenance of the reduction by the use of wires or metal plates is technically difficult because of the deep location of the injury and the smallness of the fragments. It is not advisable because of the juxta-articular location of the fracture site. One of the following procedures can be done: one may make another incision on the posterior aspect of the elbow and fix the fragments by means of a punch, which is of uncertain value. Another way is to drive a lever into the anterior aspect of the humeral diaphysis which eventually is incorporated in the plaster cast. Displacement of the fragments is made impossible. A third possibility is to maintain continuous traction by means of the Kirschner wire. This requires rigid and prolonged supervision and the taking of numerous roentgenograms.

The tourniquet is removed, hemostasis is established, sulfa and/or penicillin is inserted into the wound, and the skin is sutured with interrupted linen sutures. It is often necessary to leave portions or the entire wound open if the edema of the arm is considerable. The ultimate outcome is not influenced by this procedure.

A plaster cast extending from the axilla to the metacarpophalangeal joints is applied, the elbow being kept at 90 degrees flexion. If compression of the brachial artery is present, a window is cut in the cast over the radial artery to check the reappearance of the pulse or any changes that may occur. The plaster cast is molded around the instrument and the Kirschner wire. The arm is suspended with the hand

pointing at the ceiling. Acetylcholine is given hypodermically if necessary. The next day movements of the thumb and the shoulder are encouraged. Roentgenograms are taken. The cast is removed on the thirtieth day. At that time the dressing is changed for the first time, sutures are removed, and new roentgenograms are taken. The wound will be found well healed. The arm is kept in a sling for a few days. Soon the little patient begins to move his arm. All passive or forceful mobilization and massage are strictly forbidden.

The results of all cases of supracondylar compound fractures, simple fractures which required open reduction and supracondylar fractures complicated by injury to the vasculoneuromuscular structures were very good. In cases in which severe compression of the blood vessels would have resulted in Volkmann's contracture, this complication was averted. The course in every case was afebrile. There was some negligible loss of flexion and extension. Pronation and supination were preserved in all cases. There was no varus or valgus deformity of the elbow. No hypertrophic callous formation or myositis ossificans was observed. Muscular atrophy of the arm was practically zero. The flexion of the elbow joint eventually equalled that of the other side in spite of the fact that the brachial and biceps muscles were not approximated. The scar was irregular in a few cases, but there were no formations of contractures or keloids. The extension was not impaired, which result was sometimes observed when an anterior vertical incision was used.

GEORGE I. REISS, M.D.

Seddon, H. J., and Alexander, G. L.: Discussion on Spinal Caries with Paraplegia. *Proc. R. Soc. M.*, Lond., 1946, 39: 723.

At the end of the Nineteenth Century, cellular pathology progressed rapidly and an attempt was made to decide whether true myelitis, pachymeningitis, or compression of the arteries, veins, or lymphatics was responsible for a syndrome known as Pott's paraplegia. More recently, the authors concluded (from observations of many workers, including those of the authors, who reported a series of 186 cases) that the underlying pathology of paraplegia occurring during the active phase of the disease was different from paraplegia accurring at a time when the disease appears well healed.

In the active phase of tuberculosis of the spine, a tuberculous "abscess" is responsible in most cases for the appearance of paraplegia. Narrowness of the spinal canal, anterior concavity of the vertebral column, and the confinement of the abscess by a strong anterior vertebral ligament in the thoracic spine are the reasons why paraplegia so often occurs in tuberculosis of the thoracic spine. The primary focus, however, may also be located beneath the posterior vertebral ligament and the neural arch in rare instances. Very rarely, also, paraplegia occurs prior to the discovery, on x-ray examination, of a tuberculous focus in the spine.

Another group of paraplegias are caused by "mechanical accidents." Pathological dislocation at the site of the spinal disease may occur and cause compression of the cord, in which the tuberculous disease as such may play no part whatever. An ill advised laminectomy, retropulsion of a sequestrum, or backward slipping of an entire nucleus pulposus may be the cause of compression of the cord.

The occurrence of paralysis in the late phase of the disease was originally thought to be due to gradual overstretching of the cord over the deformity. Later observations, however, indicated that the paraplegia was due to a reactivation of the tuberculous abscess inside the spinal canal pressing on a cord whose circulation already was greatly impaired. This hypothesis is also supported by the fact that paraplegia in the late phase of the disease improves with rest, as does early paraplegia caused by a tuberculous abscess. Furthermore, at operation, tuberculous foci were found, and the removal of these abscesses brought about improvement of the paralysis.

Tuberculous pachymeningitis is very rare and has never been observed to be the cause of paraplegia. All cases of spinal tuberculosis seen by the author failed to show true tuberculous pachymeningitis, i.e., interstitial tuberculous infection of the thecal layers. The dura possesses an astonishing resistance to tuberculosis. The dura was found to be covered by tuberculous fibrous masses which could easily be stripped off, leaving the underlying dura intact.

Paraplegia may also be caused by changes within the spinal cord and may occur without extradural compression. These changes may be the result of hyperemia, or may be due to a local toxic process. Vacuolation of the white matter and changes of the myelin are indicative of degeneration of the cord.

Thrombosis of the vertebral artery, due to an adjacent tuberculous abscess, is far more common than is usually suspected. It might be supposed that with destruction of the vertebral bodies the spinal cord would be comparatively longer than the spinal canal; on the contrary, longitudinal shrinkage of the spinal cord is usually observed. The cause of this atrophy is not known.

In a series of 186 cases of spinal tuberculosis, an incidence of 193 cases of paraplegia was observed. (Some patients suffered several attacks of paraplegia.) In 39 per cent of the patients, in whom the onset of paralysis was early, spontaneous recovery occurred; in 11 per cent of the same group the condition failed to clear up. Included in the latter group were all of the cases of paraplegia which had developed as a result of "mechanical accidents." In 50 per cent of the cases, paraplegia was of late onset; one-half of the patients in this group recovered spontaneously.

Conservative treatment is recommended in cases of tuberculous disease of the spine in which the paralysis is caused by an abscess. Laminectomy is indicated as the best method of treatment for posterior spinal abscess, spinal tumor, and "mechanical accidents." If thrombosis is the cause of paraplegia,

usually with a rapid onset of paralysis, any form of therapy is useless.

Included in the present article is a discussion on the neurological complications of spinal tuberculosis. The surgical management of spinal tuberculosis at different levels is discussed.

Spontaneous atlantoaxial subluxation is illustrated by the report of a case history. The treatment consisted of "Blackburn" skull traction with a pull of 9 to 13 pounds while the patient lay in a posterior plaster shell. Within a period of 10 days, reduction was complete and an occipitoatlantoaxial fusion was accomplished with a split-rib graft.

Two 4½ year old girls with cervicothoracic Pott's disease came under observation. Both patients were treated with skull traction and a posterior and anterior shell. A special device to prevent drop foot is described in detail.

Conservative treatment is recommended routinely for thoracic Pott's disease. In cases in which neurological deterioration continues in spite of adequate immobilization, the anterior decompression procedure, as described by Mr. Dott, is employed. This procedure was used in a group of 13 patients between the ages of 6 and 65 years. Through a curved skin incision, from midline to midline of the back, the trapezius and latissimus dorsi muscles are reflected laterally and the longitudinal posterior muscles medially. Three or more ribs are then resected. The intercostal nerves are followed to locate pedicles and the dura. The pedicles are then removed to expose the anteriorly located abscess. The diseased vertebrae are excavated to eliminate any pressure on the thecal layers. The abscess is evacuated, and sequestra and displaced intervertebral discs, when found, are removed. At the termination of the operation normal pulsation of the dural sac and relaxation of the intercostal nerves are noticed. A gibbus usually facilitates exposure of the diseased area considerably. Skull traction is applied as a preliminary step and the operation is done in an anterior plaster shell.

In every one of the 13 patients operated on, a mechanical factor was responsible for compression of the spinal cord.

It is important to realize that normal spinal fluid manometer readings and a low protein content do not necessarily rule out compression of the cord.

Three of the 13 patients died—2 of uremia in 4 to 5 days after the operation, and 1 patient from an unrelieved compression of the cord. There was no evidence of dissemination of infection following operation.

In the closing remarks of the authors, 2 cases are briefly cited. In one case, stereoscopic views of an apparently quiescent "juvenile kyphosis" revealed calcification of a paravertebral abscess. In the other case, that of a 9 year old patient, a secondary focus (tuberculoma) was discovered in the cerebellum. Finally, it is pointed out that symptoms simulating ruptured intervertebral disc may very well be due to a tuberculous process in the same area.

GEORGE I. REISS, M.D.

Cleveland, M.: Orthopedic Surgery in the European Theater of Operations. *Ann. Surg.*, 1946, 124: 188.

The writer assumed the duties of Senior Consultant in Orthopedic Surgery in the European Theater about 3 weeks before D-Day, following a year's duty at the Station Hospital at Fort Jackson and 9 months' duty as Orthopedic Consultant for the Fourth Service Command.

The earlier battle casualties with compound fractures and amputations were observed and it was apparent to all the surgeons that there was room for improvement in the care of battle casualties with wounds involving the bones and joints.

Prior to D-Day the increasing personnel of the Army in the United Kingdom and the Air Force sustained many injuries of varying severity. During the period of Army training the Medical Corps had its training program. The Chief Surgeon and his staff issued a Manual of Therapy for the E.T.O. in May of 1944. This was supplemented from time to time by circular letters as experience was gained.

The earliest hospitals to arrive in the Theater were well staffed, each one of them having from 2 to 5 officers trained in bone and joint surgery. There were eventually 260 hospitals with the trained personnel spread thinly among them. The amazing fact remains that so much creditable surgery was done with so little relatively well trained personnel.

An interesting and significant study was made among Air Force casualties. Three parallel groups of wounds were treated as follows: (1) by adequate débridement and immediate primary closure; (2) by adequate débridement, immediate primary closure and the use of sulfonamides; and (3) by adequate débridement, immediate primary closure, and the use of penicillin. There was no essential difference in the healing in these three groups, which indicated that surgical treatment was of paramount importance. However, the immediate primary closure of wounds in Air Force personnel would have been folly if attempted on infantrymen wounded under different conditions.

The fixed hospitals, from the standpoint of the orthopedic surgeon, offered greater opportunity for long time contact with bone and joint casualties than did service in the continental hospitals which evacuated compound fractures and amputees at the earliest possible moment. Air evacuation was started within the first week of the invasion and finally the great bulk of the patients were transported by this means.

The first aid care of the wounded with bone and joint casualties rested with the medical enlisted men. Compound fractures of the femur, tibia, and fibula were immediately placed in a half-ring Thomas splint. For compound fractures of the foot and ankle the well padded wire ladder splint was used. Upper extremity compound fractures were placed in slings or swathes.

At the battalion level, plasma was available and whole blood was administered at the clearing station.

The bone and joint casualties for the most part were considered transportable and were sent to evacuation hospitals where adequate and thorough débridement of damaged and necrotic muscle, fascia, and skin was carried out. All possible skin and all bone fragments were preserved. These compound fractures were dressed with fine-mesh plain gauze laid over or into the wound. "Packing" with vaselined gauze prevents drainage of blood and exudate, and invites infection. Penicillin was administered and circular plaster of Paris splints of varying types for each of the long bones involved were applied. All of these circular splints must be split to the skin and slightly spread to allow for swelling in transit.

Definitive surgical treatment began at the fixed hospitals in the Zone of Communications. Delayed primary closure of these wounds was the outstanding improvement in the care of these casualties. Delayed primary closure was attempted in 2,393 patients; by suture in 2,087, by skin graft in 236, and by combination of suture and skin graft in 70. Skin grafting was done by means of split-thickness free grafts and by pedicled grafts when loss of bone and soft tissue was considerable. Ninety-three per cent of the patients upon whom closures were attempted left the hospitals with their wounds healed. Delayed primary closure of these compound fractures can be successfully accomplished in almost 3 of 4 cases, which sharply reduces the incidence of osteomyelitis.

Long bone fractures were treated with skeletal traction, usually with Kirschner wire. Of 3,190 compound fractures, 68.6 per cent were satisfactorily united, 13.3 per cent were united in malposition, and 18 per cent were ununited.

The only amputation allowed in the Theater was of the circular type which is considered an emergency measure only and received later revision at the Amputation Center.

The wounded hand was considered chiefly from the standpoint of its soft parts. A pressure dressing with the hand and fingers in functional position was recommended, with elevation of the part and early closure of the wound by suture or skin graft.

The proper treatment of wounds involving joints was based on sound surgical principles and a high percentage of joint wounds were salvaged with useful motion.

The divided or potentially divided major peripheral nerve should be given precedence over the compound fracture. Patients with this condition were transferred immediately to a neurosurgical center where the wound was closed by delayed primary suture or skin graft, the fracture being placed in balanced suspension. Three weeks after wound healing the nerve was explored and sutured if found divided. If it was necessary in order to get the nerve ends together, the bone was shortened up to 2.5 cm.

The writer concludes his report with a comparison of the medical care of the wounded in World War I with that in World War II. The general level of care of bone and joint casualties was vastly improved, there was a more complete and general understanding of resuscitation, evacuation was more rapidly accomplished, overseas hospitals were better equipped, and the incidence of infection was lower because of better surgery in the forward areas or the use of sulfonamides and penicillin.

RUDOLPH S. REICH, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Magendie, J., and Tingaud, R.: Pseudembolic Phlebitis—Grégoire's Blue Phlebitis (Phlébite à forme pseudoembolique—phlébite bleue de Grégoire). *Bordeaux chir.*, 1945, 3 and 4:112.

Following a brief review of the literature on the interrelations between arterial and venous inflammations, the authors present in detail a case of the peculiar condition known as blue phlebitis, or pseudembolic phlebitis, first described by Grégoire in 1938. The patient was a woman of 36 years with hepatic disease and a complicating pyosalpinx on the left side. The pus contained numerous aerobic and anaerobic organisms and had extended from the pelvis into the iliac fossa and left lumboiliac region, passing through the iliac veins. The patient was suddenly seized with a violent pain in the calf of her left leg with marked changes in her general condition. Simultaneously, she developed edema, cyanosis, chilling, and complete disappearance of the femoral pulsations on the same side, with slight diminution of the oscillations on the opposite side. Following infiltration of the sympathetic nerve, the pulsations reappeared for a few minutes, but then disappeared again. The patient collapsed and died.

Autopsy revealed a flat, empty artery, with slight periarteritis but no endarteritis. The phlebitic veins were distended by a jellylike, friable blood clot.

Seventeen similar cases from the literature are tabulated, with data concerning the functional signs at the onset of the condition, physical signs, arterial signs, condition of the opposite side, the end result, and verification of the vein and artery.

Grégoire's blue phlebitis, or pseudembolic phlebitis, is characterized by a violent sudden onset including severe pain and circulatory collapse. The 4 chief symptoms are cyanosis, edema, chilling and hypesthesia, and abolition of the arterial pulsations. The two functional signs at the onset are common arterial and venous manifestations. The severe pain and collapse may be caused by sudden arterial obliteration or massive and rapid venous thrombosis. Attention has been drawn repeatedly to the possibility of error in diagnosis between blue phlebitis and arterial embolism of the extremities.

Among the physical signs, only one is of venous origin, namely, the edema. Two are of manifest arterial origin, namely, the chilling with hypesthesia and the abolition of the pulsations. The fourth symptom, cyanosis or acroasphyxia, was considered up to the time of Grégoire to be of venous origin, but he attributed it to arterial causes, and later findings have confirmed his theory.

The initial pain is usually violent and sudden. It is generally located in the calf of the leg, sometimes involving the whole limb to the root of the thigh in the groin.

In rare cases there is no pain; as, for instance, in Bergeret's case, in which the syndrome appeared progressively in a greatly debilitated patient. In Grégoire's case there was a simple swelling and a sensation of heaviness. These 2 exceptions only help to prove the rule of sudden extremely painful onset.

A change in the general condition with circulatory collapse is mentioned in the majority of reports. Some patients have pale facies with anxiety, a sensation of impending death, and a small rapid pulse. This picture may be related to the extent of the thrombosis. The phenomenon of intravenous coagulation probably occurs suddenly with the brutality of a physicochemical reaction. The sudden obstruction leads to coagulation of the blood with resulting cardiac collapse, as brutal as in massive pulmonary embolism. In the present case, the veins at the root of the lower extremity were distended with blood of the consistency of currant jelly, and homogenous throughout the entire region of the leg and pelvis. These cases of massive coagulation evidently carry a desperate prognosis, for although certain drugs may prevent coagulation, once it has begun no means of checking it is known.

The dramatic onset may be due to generalized spasm, having its point of departure in a relatively minimal thrombosis, the resolution of which may result in instant relief. It is unwise, therefore, to base the prognosis on the intensity and apparent severity of the initial violent circulatory collapse. In many cases, the absence of pulsation is due to spasm without thrombosis, as evidenced by recovery, even though temporary, following intervention on the sympathetic system. The cause of the spasm may persist in spite of the treatment. The maximum reflex action probably springs from the perivenous sympathetic nerve irritated by the sudden distention and inflammation of the venous walls in cases of massive thrombosis. One may, thus, have to deal with a functional reflex, a sort of autodefense. Sudden distention of the venous system diminishes the supply of blood to the arteries. The enormous, fusiform, moniliform dilatation of the vein, and marked perivenous inflammation encountered at operation, and seen at autopsy, indicate the intensity of this spasmodic reflex. In cases involving a whole limb it would be most difficult to cut the path of the vasomotor reflex. Here an operation as high as possible on the sympathetic nerve would be indicated, but it seems problematic whether the state of collapse in such patients would permit resection of the lumbar sympathetic. The authors were greatly deceived by the transitory effect of infiltration of the lumbar sympathetic in the present case.

The prognosis in blue phlebitis is poor, even though the spasmodic element is indicated by intermittent arterial obliteration. Some cases go on to complete recovery, while others go on to an ordinary

phlebitis with final cure. However, the outcome is unfavorable in the majority of cases. Many cases will require amputation for gangrene and numerous fatal cases have been reported.

Besides this blue phlebitis due to arterial spasm complicating a phlebitis, of which the present case is an example, there is phlebitis of similar aspect, due to the more common association of arteritis and chronic phlebitis. In this case the symptoms are progressive, and the striking initial functional or general symptoms are lacking. Although this type of phlebarteritis is a blue phlebitis, it cannot be classified as a pseudembolic phlebitis, and its diagnosis is of much less significance. Between these two types, the pure spasmodic and chronic organic arteritis, all transitions are possible with the association of a spasmodic element and a more or less marked endarteritic lesion. Nevertheless, the pseudembolic type due to spasm remains the most curious and interesting of these arteriovenous inter-reactions.

EDITH SCHANCHE MOORE.

Shumacker, H. B., Jr.: Incisions in Surgery of Aneurysms. *Ann. Surg.*, 1946, 124: 586.

In the surgical treatment of aneurysms it is important to use an incision which permits of easy and complete access to the vessels involved. The incision should be so placed that, by lengthening it, the vessels distal and proximal to the site of suspected pathology are accessible without difficulty.

The author describes this general problem, and particularly that of exploration in the popliteal fossa and in the anticubital space. In his experience it is rarely, if ever, necessary to use incisions other than those which are sound from a plastic standpoint. A number of specific problems are discussed, and methods which have proved satisfactory are described.

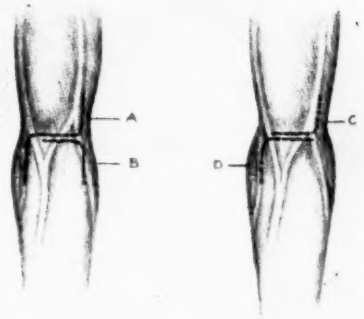


Fig. 2. Incisions used in exposure of brachial vessels in anticubital fossa. a, Usual incision for exposure of brachial vessels in anticubital space. b, Incision used when lesion is suspected in proximal portion of ulnar vessels. c, Incision used when brachial vessels are involved just proximal to anticubital crease. d, Incision used for exploration of distal end of brachial or proximal end of radial vessels. (Courtesy of J. B. Lippincott Co.)

If the circulation is adequate for surgery of the aneurysm, the distal flap will have an adequate blood supply. EMIL C. ROBITSHEK, M.D.

Potts, W. J., Smith, S., and Gibson, S.: Anastomosis of the Aorta to the Pulmonary Artery. *J. Am. M. Ass.*, 1946, 132: 627.

Following the lead of Blalock and Taussig who in 1945 introduced arterial anastomosis of the subclavian or innominate artery to either the right or left pulmonary artery for the relief of anoxemia due to pulmonary stenosis or pulmonary atresia, the

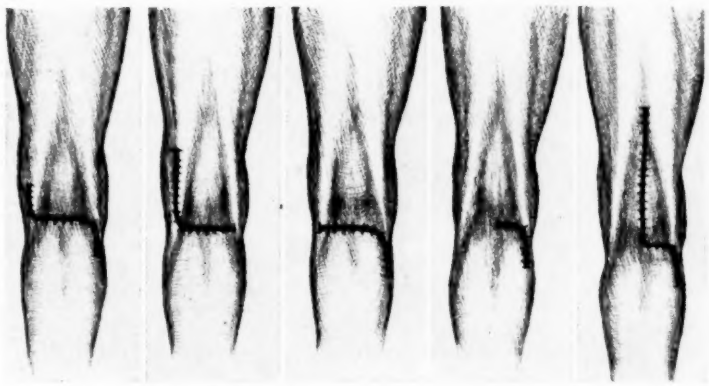


Fig. 1 (Schumacker). Skin incisions used in exploring popliteal vessels. a, Incision used when the lesion exists in the popliteal vessels in the midpopliteal space. b, Incision used when lesion is higher in the popliteal fossa. c and d, Incisions used for exploring distal popliteal vessels. e, Modified incision useful when associated nerve lesion requires exploration.

authors devised a method for successfully anastomosing the aorta and the left pulmonary artery. This report covers the work done on 30 dogs and on 3 children whose case reports are given in detail.

The surgical approach and technique of the procedure are described as well as some of the difficulties encountered. A special clamp was devised to grasp the aorta and pinch off a segment for anastomosis while the arterial flow was still allowed to continue through the main channel of the vessel; this instrument as well as other standard instruments modified for work in a small deep cavity are illustrated.

The authors suggested a possible advantage in this operation in that they could make the anastomotic channels whatever size seemed proper; also it avoided sacrifice of the innominate artery with the associated hazard of an inadequate blood supply to the brain. In no instance, dog or human, did postoperative thrombosis pose a problem.

EDWARD H. CAMP, M.D.

BLOOD; TRANSFUSION

Estren, S., Médal, L. S., and Dameshek, W.: Pseudohemophilia. *Blood, J. Hemat.*, 1946, 1: 504.

The authors note that the hemorrhagic disorders can in almost all instances be fairly readily classified as those associated with (1) a deficiency in blood platelets, i.e., thrombocytopenic purpura; (2) a disturbance in one of the coagulation factors of the circulating blood, i.e., hemophilia, hypoprothrombinemia, or fibrinopenia, and (3) a disturbance of the capillary wall, i.e., vascular or nonthrombocytopenic purpura. In occasional instances, however, the attempt to classify an example of excessive bleeding becomes difficult.

Eleven cases, which have been observed by the authors, are presented. These cases have been characterized by an excessive tendency to bleed in the presence of normal platelets, a normal coagulation time, normal serum fibrinogen, and a normal prothrombin time. The only regular abnormality has been a prolonged bleeding time. Similar cases have been previously called "pseudohemophilia," and although this designation leaves much to be desired, the use of the term continues chiefly for want of a better title. Recognition of these cases becomes important since excessive bleeding may follow relatively insignificant operative procedures.

This report by the authors deals with the study of 11 cases which have been classified as pseudohemophilia, together with a critical review of the reported cases. A study of the different tests used in establishing the diagnosis of a hemorrhagic disturbance has also been made, and is reported.

The historical aspects of pseudohemophilia are presented and an analysis of cases including those in the literature are presented. The cases in the literature show a predominantly positive family history of a tendency to bleed. In the 11 cases of the authors, 4 patients had a definite history of familial bleeding. Of the 62 cases in the literature, 33 of the patients were females, and 29 were males. Of the 11 cases of the authors, 7 were females and 4 were males. Two cases of pseudohemophilia are reported in negro brothers. All other cases occurred in white individuals.

The cardinal symptom of pseudohemophilia is excessive bleeding: from the nose, the gums, the gastrointestinal tract, the uterus, into the skin, the urine, and the joints. Although bleeding is at times completely spontaneous, it usually occurs after slight cuts or trauma. Postoperative bleeding is common and marked.

In the entire group, epistaxis was the most prominent symptom; this occurred in 75 per cent of the cases. Usually, the bleeding was spontaneous, although perhaps more marked when precipitated by trauma. It was most intense during childhood, became less frequent and less severe in adult life, and in some cases completely disappeared.

Bleeding into the skin occurred in 70.3 per cent of the total number of cases. Usually, this symptom was manifested as easy bruising, but spontaneous ecchymoses were also common. Dental extraction often gave the first indication of pseudohemophilia. Excessive bleeding occurred with dental extraction in each of the 11 cases of the authors. Uterine hemorrhage, in the form of menorrhagia or metrorrhagia, occurred frequently and was found in 20 of the 26 women above the age of 12 years. The symptom took no special form, but presented itself as unduly profuse, prolonged, or repeated hemorrhage. In some patients menstrual bleeding was of such severity as to necessitate hospitalization and transfusion.

The bleeding time was always increased. It varied from normal to over 300 minutes in the recorded cases, and from 2½ to 90 minutes in the cases of the authors. The bleeding time was often extremely variable, being greatly prolonged at one time, and only slightly increased or even normal at other times. As a general rule, the coagulation time in pseudohemophilia is normal, but slight elevations, to the degree found in hemophilia, may be present. Marked prolongation suggests either a complicating factor, such as hypoprothrombinemia, or true hemophilia.

Of 54 cases in which the results of a capillary fragility test were reported, 23 (42.6 per cent) showed increased fragility, 26 (48.1 per cent) showed normal fragility, and in 5 cases (9.3 per cent) the fragility was normal on some occasions and increased on others. Clot retractility was mentioned in 50 cases. In 43 cases (86 per cent) it was normal; in 6 (12 per cent) it was abnormal; in 1 case (2 per cent) the test was normal once, and abnormal another time. All of the authors' cases but one showed normal clot retractility. Normal retraction of the clots may be considered characteristic of pseudohemophilia.

In their discussion of the diagnosis of pseudohemophilia, the authors observe that the term "pseudohemophilia" should not be restricted to the group of cases in which there is a hemorrhagic disorder char-

acterized by a tendency to bleed in the presence of normal platelets, a normal coagulation time, and an increased bleeding time. The recognition of a typical case of pseudohemophilia is not difficult. Either sex is affected. The patient complains of excessive bleeding over a long period of years, often since childhood. A positive family history is frequently obtained. Physical examination is usually negative. Ecchymoses are common, but petechiae are rare. The tendency to bleed is accompanied by an increased bleeding time, an essentially normal coagulation time, a normal number of platelets, and a normal clot retraction.

The etiology and pathogenesis of pseudohemophilia are not known. Three groups of factors are known to be concerned in the hemorrhagic disorders: plasma factors, platelet factors, and vascular factors. Each of these has been studied in cases of pseudohemophilia. Most data tend to classify pseudohemophilia as a disorder of the vascular apparatus.

The conclusions are as follows:

Eleven cases of a hemorrhagic diathesis are presented, characterized by increased bleeding time in the presence of a normal coagulation time, normal blood platelet count, and normal clot retraction. An analysis of 62 similar cases in the literature is presented. These cases, which have been designated as pseudohemophilia, probably represent a particular disorder of the capillaries, in which capillary retractility following trauma may be inherently defective. The differential diagnosis of these cases from other types of hemorrhagic disease and the necessity for their recognition, particularly from the prophylactic standpoint, are stressed. Except for easily accessible local bleeding, therapy is at present ineffectual.

HERBERT F. THURSTON, M.D.

Perkins, W.: Pseudohemophilia; Case Study. *Blood, J. Hemat.*, 1946, 1: 497.

The author presents a case of a hereditary hemorrhagic disease, primarily because the family history offers an unusually good opportunity to trace the genealogical background in this particular instance. The only persistent abnormality found has been prolongation of the bleeding time. Such a condition, which is often hereditary and is characterized by a prolonged bleeding time in the presense of normal platelets, has been previously described and referred to as pseudohemophilia, or hereditary hemorrhagic thrombasthenia.

The present case of hereditary pseudohemophilia in a 20 year old white American-born male was transmitted by, and occurred only in, the male line. The occurrence of the condition in the male offspring of the patient's father and of the latter's second wife irrefutably proves this point.

In addition to the case history, the blood findings also are presented in detail. The degree of prolongation of the bleeding time varied from day to day, and was occasionally normal. Except for transient hypocalcemia with tetany, no defect in the blood elements nor in clot formation was noted. There appears to be a failure of normal capillary constriction following trauma. The author notes that this conclusion confirms the original observations of Macfarlene. Whether or not this physiological defect is entirely responsible for the prolonged bleeding time is not proved, but is under further investigation.

HERBERT F. THURSTON, M.D.

Hill, J. M., and Haberman, S.: Demonstration of Rh Antibodies in the Newborn and Further Evidence of the Pathogenesis of Erythroblastosis. *J. Lab. Clin. M.*, 1946, 31: 1053.

It is generally accepted that hemolytic disease of the newborn, or erythroblastosis, with a few possible exceptions, is caused by the production of Rh antibodies in Rh-negative mothers bearing Rh-positive children. Although the evidence for each step in the pathogenesis of the disease is not complete, the sequence of events may be outlined as follows: (1) the Rh antigen in the fetal erythrocytes is inherited from the father, (2) it gains access to the mother's circulation, (3) evokes a maternal response of Rh antibodies, (4) these antibodies, in turn, pass across the placenta into the fetal circulation or, after birth, are absorbed from the mother's milk, (5) they are adsorbed upon the infant's red cells, and (6) this results in their destruction which produces anemia and jaundice. Further reactions on the part of the tissues of the newborn, such as myeloid hyperplasia, ectopic hematopoiesis, and edema, then follow according to the severity of the disease.

The authors are concerned principally with the demonstration of evidence for events 4, 5, and 6 in the pathogenesis as outlined. This consists of the identification of Rh antibodies in the fetal serum, their specific adsorption on the cells of the newborn, and the hemolytic destruction of Rh-positive human erythrocytes in vitro. The demonstration of Rh antibodies in the infant has been difficult and uncertain. The elution technique has demonstrated the presence of adsorbed anti-Rh agglutinins. This is done by removing the agglutinins from the red cells into saline solution by brief subjection to a temperature of 56° C. The authors have employed this method routinely in all cases of hemolytic disease of the newborn since their first report. Positive tests have been found in only 3 of 10 cases of erythroblastosis. The presence of antibodies adsorbed on the Rh-positive erythrocytes of the infant has never been demonstrated except when they were also present freely in the infant's serum and in the serum of the mother. The use of the blocking test slightly increases the number of positive demonstrations of fetal antibodies.

A new approach to this problem of detecting fetal antibodies is the use of antihuman globulin serum. The action is to develop an observable agglutination in which the specifically adsorbed antibodies are not able to agglutinate by themselves (blocking or incomplete antibodies). The authors have called this the developing test. They have employed this developing serum both in a test for weak antibodies in

the serum of mothers and in a diagnostic test for hemolytic disease of the newborn.

The methods used were as follows:

1. Testing of the serum of mother and infant when isoimmunization was suspected by the test tube method of Levine and Stetson.

2. Wiener's method was used to detect the incomplete blocking antibody described by Race and Wiener.

3. The elution technique of Landsteiner and Miller was used routinely to attempt to demonstrate adsorbed Rh agglutinins on the cells of the blood in all cases of hemolytic disease of the newborn and on the erythrocytes of all babies whose mothers showed a positive test for Rh antibodies.

4. If no clumping was seen in the agglutination test, a blocking test was done with a drop of anti-Rh serum, and the lack of agglutination indicated the presence of blocking or incomplete agglutinins.

5. For the purpose of detecting weak Rh agglutinins, incomplete antibodies, or immune globulin, an antihuman globulin serum was used; a positive developing test indicating specifically adsorbed immune globulin was shown by definite clumping of the red cells.

6. As a possible diagnostic test for erythroblastosis, the developing serum was used to demonstrate the presence of antibodies specifically adsorbed on red cells in vivo.

7. The demonstration of hemolytic activity of Rh serum in vitro.

Ten cases were investigated. The erythroblastosis was listed as severe in 5 cases, moderately severe in 2, moderate in 1 case, mild in 1, and subclinical in 1. The outcome was listed as recovery in 5 cases, kernicterus in 1 case, stillborn in 1, partial recovery in 2 cases, and macerated fetus in 1 case. The treatment consisted of early transfusion in 3 cases, delayed transfusions in 3, and no transfusion in 2.

Since the developing test applied to erythrocytes of the newborn showed promise of being diagnostic for erythroblastosis, its specificity was investigated by performing routine developing tests on the erythrocytes of all cord bloods. A total of 365 developing tests on cord cells were done. Four of these did not show clinical erythroblastosis, but a background and history compatible with a subclinical isoimmunization was observed in the 4 cases. In this series developing tests were obtained on both sera and cells of 5 stillborn infants clinically not erythroblastotic. In addition, there was 1 hydropic stillborn from which neither serum nor erythrocytes could be obtained. Clinical icterus was found in 4 infants negative to the developing test, each of whom had the same Rh type as the mother. These were considered to be examples of physiological jaundice.

The successful removal of Rh antibodies from cord erythrocytes by elution in 3 cases of erythroblastosis is significant, chiefly as a demonstration of the actual sensitization of the infant's cells preliminary to their destruction and as an opportunity to prove the specificity of this reaction by further readsorbing of the eluted antibodies on known Rh-positive red cells. This readsorption may be indicated by agglutination or the blocking or developing tests may be required, according to the type of antibody involved. This proof that the eluted material consisted of specific Rh antibodies of the same type found in the mother's serum indicates their origin in the mother as well as their transport across the placenta from the maternal circulation into that of the fetus. The specific nature of the union of the antibody to the Rh antigen of the erythrocyte is strongly suggestive of the destructive role this antibody must play in sensitizing the red cells, for their hemolysis in vivo (so characteristic of erthrocytes in vitro) by the Rh antibody is significantly demonstrated by the greater liberation of hemoglobin as compared to controls. The authors experiments seem to give evidence that these antibodies can act as hemolysins as well as agglutinins in vitro. In comparing the relatively weak hemolysis seen in vitro with the severe hemolysis common in vivo it should be noted that in the latter cases red cell destruction may be greatly enhanced by the action of the spleen in its role of phagocytosing the slightly damaged corpuscles. Finally, the titer of 1:2000 effective in the test tube is sometimes exceeded in the mother's serum, particularly if the developing test is used to demonstrate the titer of the anti-Rh immune globulin.

The elution technique, in conjunction with the demonstration of hemolysis in vitro, presents additional evidence of the sequence of events in the pathogenesis of erythroblastosis. It seems to offer little as a test to identify antibodies in the infant's blood. Only in those cases that showed antibodies in the serum of the mother were the elution tests on fetal cells positive. In this series of cases it was further demonstrated that positive elution tests to demonstrate antibodies adsorbed on fetal cells were found only in those cases in which the cord serum as well as the maternal serum contained demonstrable Rh antibodies.

Since adopting the use of antihuman globulin serum as a developing test in suspected Rh isoimmunizations, the authors have been able to confirm the advantages of this serum in respect to its sensitivity to incomplete antibodies and to prove its usefulness in demonstrating Rh antibodies in the serum of mother and infant when other tests failed. Of even greater interest is the fact that the developing test not only detects incomplete or blocking antibodies but also detects specific Rh antibodies not demonstrable with agglutinating or blocking tests. The developing test also shows agglutination when agglutinating Rh antibodies are present, but the clumping reaction is much stronger than that of the agglutinating antibodies alone. In the author's cases it was found that the developing titer equaled, or far exceeded, the agglutination or blocking titers. There were 2 instances of developing titers in mother or baby which were much higher than agglutinating or blocking titers and even examples of positive tests when the other 2 tests were negative. This evident

difference between the 3 tests indicates that the basic character of Rh antibodies must be different. In the case of the agglutinin which saturates the hapten and produces the visible reaction of clumping, the classical antibody is seen. In the case of the blocking reaction an antibody is present which is capable of specific hapten saturation without the production of clumping. However, in the case of the immune globulin, demonstrable by the developing serum, the antibodies apparently are capable of specific adsorption without saturation of the available haptens and without the production of agglutination. The unique feature of this developing reaction in not saturating the available haptens is further demonstrated by the fact that after Rh-positive cells are subjected to the immune globulin no interference is found with the agglutinability of these cells with known Rh-typing serum. They have designated this third type as developing antibodies. This developing antibody is of great clinical importance, since it has been observed that clinical erythroblastosis may occur in the Rh-positive mother in whom no antibodies were evident. It has been noted that the observed titers of maternal antibodies have shown little or no correlation with the severity of the disease in the infant. This is because the immune substances were previously hidden to the ordinary agglutinating test. This was demonstrated in some of the cases of the authors.

The application of the developing test to the erythrocytes of the newborn shows promise of a specific test for erythroblastosis. This test may satisfy the requirements of sensitivity and specificity to fill this role. The developing test as applied to washed infant's cells is not necessarily specific for Rh antibodies but presumably would detect any specifically adsorbed antibodies.

The specificity of the developing test is supported by the negative reactions obtained in stillborn infants and cases of jaundice of the newborn in which no evidence of erythroblastosis could be found.

Analysis of the reported cases of hemolytic disease of the newborn brings out 2 therapeutic considerations. First, the use of early and adequate transfusion of Rh-negative blood, through the cord route in severe cases, is urgently recommended. Second, the infant should not be put on the breast if any Rh antibodies can be demonstrated, even if no clinical erythroblastosis is apparent. The developing test on infant erythrocytes probably will be sufficiently sensitive to determine this question for Rh-positive babies of Rh-negative mothers.

LeRoy J. Kleinsasser, M.D.

Lozner, E. L., Lemish, S., Campbell, A. S., and Newhouser, L. R.: Preservation of Normal Human Plasma in the Liquid State. Clinical, Chemical, and Physicochemical Studies during 3 Years of Storage at Room Temperature. *Blood, J. Hemat.*, 1946, 1: 459.

Liquid plasma is the popular form for the preservation of plasma because of its simplicity, economy, and immediate availability, and despite the fact that it provides a good bacteriological culture medium even when containing bacteriostatic agents in clinically nontoxic concentrations. That plasma may be preserved in the liquid state for many months and be administered with clinical safety has been demonstrated by many investigators, but the necessity for meticulous asepsis is imperative.

Previous articles concerning this study of plasma preserved in liquid state at room temperature for 2 years stated that when liquid plasma was properly prepared it may be administered to patients with safety and benefit despite the inactivation within 6 months of certain labile constitutents and a slow increase in the nonprotein nitrogen and alpha-amino nitrogen content, i.e., free amino acids in blood filtrates as determined by the ninhydrin-carbon dioxide method).

This communication has as its purpose the reporting of electrophoretic, osmometric, and viscosimetric studies on plasma stored in the liquid state for 3 years, and to summarize the clinical and chemical observations to date. Thus, practically the work would form a reasonable basis for the determination of the "expiration date" of plasma preserved in the liquid state.

The authors present their results as the chemical, electrophoretic, osmometric, and viscosimetric findings. Chemically, it was found that there was a notable increase in the alpha-amino nitrogen concentration during the first 2 years of storage; the nonprotein nitrogen concentration increased steadily for the entire period. Osmotically, the stored plasma was slightly but significantly more effective than fresh plasma. Three year old plasma was slightly more viscous than fresh plasma but the difference was of no practical significance. Electrophoretic patterns showed that after 3 years of storage there was a large increase in components with the mobilites of alpha globulin and albumin at the expense of all the gamma globulin, all the fibrinogen, and all of the beta globulin.

The results of questionnaires concerning some 3,384 administrations of plasma more than a year old, and a comparison of these results with those of dried plasma indicated that stored plasma was as therapeutically effective as fresh plasma and with considerably less reaction rate. However, stored plasma should never be used for its immune properties or to supply blood coagulation factors in patients with a hemorrhagic diathesis. Also, overenthusiastic use of stored plasma by simple dilution might result in a fall of the patient's globulin and prothrombin.

Thus, liquid plasma stored for periods up to 3 years appeared to be an adequate therapeutic agent to supply colloid of human origin. Except for the fact that stored plasma is relatively isotonic, whereas human serum ablumin as supplied is hypertonic, the two agents are similar in their clinical indications and precautions. Both are preserved in the liquid state at room temperature, neither supplies much except a human colloid, and neither should be used excessively.

The blood drawing and plasma preparation should be done with "closed systems" and meticulously aseptic and scrupulous bacteriological control throughout, as liquid plasma, even when containing bacteriostatic agents, may permit bacterial growth; contaminants during preparation may multiply to dangerous proportions during preservation for even short periods. EDWARD H. CAMP, M.D.

LYMPH GLANDS AND LYMPHATIC VESSELS

Tice, G. M.: Lymphoepithelioma. *Radiology*, 1946, 47: 116.

In the present article, the development of our knowledge of tumors of the pharynx and nasopharynx is reviewed, and the author has shown that lymphoepithelioma of this area has gradually come to be considered as a clinical entity, the importance of which lies mainly in the fact that these tumors are quite radiosensitive and amenable to irradiation if recognized early.

The early symptoms which were listed by previous observers are (a) pain in the eye with or without diplopia, (b) pain in the ear resembling an acute infection or mastoiditis, (c) trigeminal neuralgia, (d) ptosis of an eyelid, and (e) enlargement of the cervical lymph nodes.

Irradiation is believed to be the only method of treatment. For tumors in the tonsillar area, the author prefers roentgen to radium treatment (300 roentgens intraorally every other day, with 300 roentgens to the adjacent cervical area on alternate days, a total skin dose of 3,000 roentgens and a total intraoral dose of 2,000 to 3,000 roentgens). For tumors in the posterior nasopharynx, 1,300 to 1,800 mgm. hours of radium are given, with intensive roentgen irradiation of the cervical lymph nodes.

Early recognition of the condition and intensive early treatment offer the only hope for cure. Distant metastases are not amenable to cure, and even symptomatic relief, obtained by irradiation, is not as great as that obtained in similar metastases from cancer of the breast.

A series of 12 cases are reported. Six of the patients have died, the average length of their survival being 2½ years from the beginning of symptoms. The corresponding time of survival of the 6 patients who were alive at the time of the author's report was 2 years.

Whether transitional-cell carcinoma, undifferentiated-cell carcinoma, and lymphoepithelioma are essentially the same has not been determined, but therapeutically this is of academic interest only.

HEINRICH LAMM, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Rubin, L. R.: Repair of Avulsion Wounds of the Hands and Feet by the Flap Graft Technique. *Am. J. Surg.*, 1946, 72: 373.

The treatment of avulsion wounds of the hands and feet in a general hospital functioning in the Mediterranean theater of operations during World War II presented definite problems which necessitated a closure technique providing a thick fatty skin cover within the shortest period of time. All of these wounds were either penetrating or perforating; tendons, nerves, and bones were exposed. In most cases the bones were fractured and often fragments were missing. While many of the cases were clinically clean immediately after débridement at evacuation hospitals, all were contaminated and many were infected by the time the general hospital was reached. Unless covered with a skin layer early, exposed tendons and bones soon became necrotic. To prevent further loss of the deep tissue structures, and to provide for the earliest functional results, all techniques of skin grafting were investigated.

The free grafts, Thiersch, split skin, and full thickness grafts would not take over the deep structures mentioned. A fat-containing pedicle type of graft was consequently indicated which would (1) cover exposed bone, tendon, or deep irregular muscle defects, (2) not adhere to the underlying structures, and (3) not contract excessively.

Three such types of tissue covering were available —the contiguous skin flap, the tube, and the flap grafts. The contiguous skin flap or the utilization of the tissue adjacent to the wound was limited because of the relative immobility and inelasticity of the tissues of the hands and feet, due to the paucity of subcutaneous fat. This was especially true for large wounds.

The tube graft was an ideal technique for covering, but required at least three, and more often additional, operations to cover a defect. To decrease the number of the operations required, the flap graft was reinvestigated and used instead of the tube graft.

Wounds of the hands and feet presented defects which could be brought to the donor sites with relative ease, which obviated the necessity for tubing. An ideal situation was thus present for the use of the flap graft.

The usual donor site for hand defects was the abdomen. Practically all flaps were cut with the pedicle facing posteriorly or diagonally superiorly, so as to allow the lower thoracic and posterior lumbar vertebral vessels to enter the flap. On occasion when indicated, the flap base was directed superiorly or inferiorly with the source of blood supply coming from either the thoracoepigastric vessels or the superficial iliacs coming up to anastomose with them. The flaps were thick and included all layers of skin and fat down to Scarpa's fascia. The size of the flap varied considerably; the author did not exceed the rule of "length no more than three times the width" but always tried to get the widest pedicle possible.

A loose pedicle was important to avoid pull on the graft when the hand was placed on the abdomen. The part sutured to the defect was placed with normal skin tension.

The anterior, lateral, and medial aspects of the thigh were chosen as the best donor sites for the foot defects. In most cases the base of the flap was placed in the superior direction. However, in cases in which the defect was on the lateral aspect of the foot or ankle, a retrograde flap was raised, the blood supply coming from the rich plexus of vessels about the knee.

In search for a more comfortable donor site, the lower leg was considered but found unsuitable for several reasons. The subcutaneous tissue contained little fat, a limited blood supply, and lacked contour for large defects. Another disadvantage was the lack of silent areas on the leg.

When there was doubt as to the circulation of the flap, either because of the position or the size, a delayed technique was used. The ideal technique called for two delays. All flaps raised were of a single pedicle type.

Only frankly necrotic tendon and bone were surgically removed before a flap was placed over the defect; infected tendons were not débrided. All granulation and early scar tissue were removed, making sure there would be no barrier for new blood vessel penetration. Fresh skin edges were cut and then slightly undermined to facilitate suturing to the flap. Since many wounds were of the bursting as well as the lacerating type, the size of the defect could often be decreased by undermining the adjacent skin edges, sliding or rotating that tissue, and then suturing. Not only did this decrease the size of the flap to be raised, but also it gave a regular edge to the wound. In some of the large defects of the feet it was thought advisable to decrease the size of the defect because of the difficulty in obtaining sufficient flap from the thigh. A combined flap and split skin graft technique was used.

There can be little doubt as to the necessity of grafting exposed tendons and nerves with a fatty cover. Since past experiences have shown that such uncovered deep structures became necrotic unless covered early, flaps were attempted even when they were infected.

Forty-nine cases of flap graft closures were performed for deep wounds of the hands and feet, with good functional results. The very early cover of exposed infected tendon and bone is advocated by the use of this technique. The flap graft technique

is quick and sure of take in the covering of wounds of the hands and feet with a fat containing skin cover. The principles of multiple blood transfusions and penicillin therapy are believed to be important adjuncts in the take of grafts. Early physical therapy for optimal function is a full time job for a trained nurse or an assistant who understands the problems.

JOHN E. KIRKPATRICK, M.D.

Cadenat and Monsaingeon: Gas Embolism of the Brain. The Good Effect of the Intravenous Injection of Novocain (Embolie gazeuse du cerveau. Heureuse action de la novocaïnisation intraveineuse). *Mém. Acad. chir.*, Par., 1946, 72: 355.

A woman of 47 years was operated on for calculous cholecystitis. Ten days after the operation at about 10:30 o'clock in the evening an exploratory pleural puncture was made on account of a postoperative pleural syndrome. The puncture was made with a very fine needle and did not yield any fluid, but a few minutes later the patient coughed up foamy blood. After a few seconds she lost consciousness and the pulse could not be felt. Her eyes were half open and showed horizontal nystagmus to the left. There was conjugate deviation of the head and eyes to the left. The limbs were flaccid and fell heavily; there was epileptoid tremor of both feet and a bilateral Babinski sign. At about 11 o'clock an intravenous injection of 20 c.c. of 1 per cent novocain was given. Recovery was remarkably rapid. Motion and sensation were quickly restored and after about 2 minutes the Babinski sign disappeared. At 12:30 o'clock the patient was in good condition and remained so. It seems certain that this was a case of gas embolism of the brain.

In spite of the severity of the attack, improvement had begun even before the novocain was administered and it is probable that the patient would have recovered without the injection. However, it is worth while to study such cases carefully to determine the indications and mode of action of the drugs used and the finer mechanism which produces the accidents. The differences between the findings in animal experiments and in this clinical case are discussed, and it is suggested that possibly the vasodilatation brought about by the novocain opened up new vascular networks that had previously been closed, such as the pial network and the deep subcortical capillary network.

In the discussion ISELIN described 3 cases of surgical embolism in which the intravenous injection of 10 c.c. of 1 per cent novocain gave extraordinarily rapid and favorable results.

AUDREY G. MORGAN, M.D.

Leriche, R.: The Prognosis and Treatment of Large Emboli of the Pulmonary Artery (Prognostic et traitement des grandes embolies de l'artère pulmonaire). *Lyon chir.*, 1946, 41: 257.

Death from pulmonary embolus occurs suddenly. The period permitted for the observation of symptoms is brief and accurate diagnosis is correspondingly difficult. Diagnosis is usually based on a history of an operation from 6 to 10 days earlier, a sudden collapse, pain, anxious expression, air hunger, dyspnea followed by cyanosis, and an irreversible fall of the blood pressure.

The most accurate means for localizing the site of embolus is to eliminate the vegetative elements by sympathetic block. This procedure clarifies the clinical picture by leaving only the effects of the mechanical block in the pulmonary circulation. Reflex phenomena may be only supplementary or they may be a major portion of the illness.

The treatment of pulmonary embolus involves first a suppression of sympathetic vasoconstrictor effect, and then re-establishment of permeability of the artery. Stellate ganglion block may modify the circulatory obstruction to such a point that it remains compatible with life; also, it may indicate the need for embolectomy. If the patient's condition improves after stellate block the embolus probably has obstructed a secondary branch of the pulmonary artery rather than the main trunk. If improvement is only momentary a major trunk probably is obliterated and immediate embolectomy is necessary. The intravenous injection of 10 c.c. of 1 per cent novocaine may accomplish the same purpose and is easier to perform. However, removal of the sympathetic effect produces no improvement for 2 of every 3 patients. In these, one must assume that the obstruction is of the main pulmonary artery and its two branches and that operation is mandatory.

Embolectomy is a major operation requiring trained and skilled personnel with proper instruments, sterile and available for immediate use. Sixty per cent of the patients with pulmonary emboli die within 15 minutes. Others may have clots lodged in lobar branches from which they cannot be removed. Still others who may survive surgical removal of a clot may sustain a fatal recurrence.

If the operation is undertaken the author prefers a T-shaped incision with a horizontal limb 10 cm. in length over the second rib or second interspace. The vertical limb is placed 1 cm. to the left of and parallel to the left border of the sternum from the sternoclavicular articulation to the fourth costal cartilage. The second and third ribs are cut 7 or 8 cm. from the sternum and disarticulated. The pleura is retracted and the internal mammary vessels are ligated if necessary. The pericardium is opened at the level of the third cartilage and the aorta and pulmonary artery are identified. This important step requires skill and a knowledge of anatomy. A rubber tube is passed around the two vessels to serve as a tractor and to control circulation through the vessels. Interruption of the circulation must be brief. It is hazardous to exceed the 45 second period advocated by Trendelenburg. While the assistant holds the rubber tourniquet and obstructs the circulation the operator incises the pulmonary artery. Preliminary aspiration of the vessel may obviate confusion with the aorta. The incision in the pulmonary artery should be placed at the level of the

second costal cartilage to avoid injury to the valves which lie at the level of the third cartilage. The artery may be incised through three-fourths of its circumference to permit the introduction of forceps, or a small opening may be made for the insertion of an aspirating cannula. After the clot has been removed the arterial wall is repaired with linen or silk and the pericardium closed.

The author records 11 instances of successful operative removal of the clot in 150 known attempts. These 11 successes are enough to justify the operation if time and indications permit. Future developments with heparin and allied substances may conceivably eliminate the entire problem of phlebothrombosis and pulmonary embolism.

EDWARD W. GIBBS, M.D.

Magendie, J., Tingaud, R., and Ballanger: The Anticoagulant Effect of Hydroxycoumarin in Vivo. Its Value and Use in Surgery (L'action anticoagulante de l'hydroxycoumarine "in vivo." Son appréciation et son utilisation en chirurgie). *Bordeaux chir.*, 1945, 3 and 4: 122.

Following a review of the literature on the experimental studies of hydroxycoumarin and on its toxic effects in human subjects, its preventive effects in venous thrombosis, and its curative effects in phlebitis, the authors present their own conclusions based on a study of 20 cases. The dosage employed was 10 mgm. per kgm. of bodyweight, or not more than 600 mgm. per dose. In a few cases a second dose of similar amount was administered after from 8 to 10 days. In 3 instances, in patients with hepatic disease, the initial dose was followed by symptoms of malaise with drawn facies, slightly depressed eyes, very slight subicteric conjunctivæ, nausea, sweats, and epigastric distress. These symptoms subsided spontaneously. There was no instance of renal reaction. No hemorrhagic sequelae were observed.

The effect of hydroxycoumarin on the coagulation varied according to the dose employed. The dose of 10 mgm. per kgm. of body weight was generally too small and had to be repeated. However, the dose should not be repeated without control of the prothrombin level, because the effect of the initial dose is more prolonged than hitherto reported. A cumulative effect may exaggerate the effect of repeated doses.

The preventive effect of hydroxycoumarin in phlebitis cannot be evaluated on the basis of the 15 cases here presented. The relatively low incidence of phlebitis in operations particularly likely to cause venous thrombosis, however, seems to indicate the efficacy of this method as the dosage used was less than the optimum.

The authors believe that hydroxycoumarin should be employed routinely in all severe surgical cases, not blindly in standard dosage, but with individualized dosage for each case, based on a careful study of the prothrombin level, which should be determined at least every other day. In 3 cases of beginning and confirmed phlebitis, hydroxycoumarin seemed to have a beneficial effect, resulting in a sensation of well-being, shortening the duration of the edema and immobilization, and diminishing or abolishing the sequelae. With the dosage employed no instance of embolism was observed, not even in a case with recent pulmonary infarct.

The preparations of hydroxycoumarin employed in the present series were "anathrombase" and "acavyl." EDITH SCHANCHE MOORE.

Hurley, V.: The Surgical Lessons of the Last 5 Years of War and Their Application to Post-War Surgical Practice. *Austral. N. Zealand J. Surg.*, 1946, 15: 235.

The present article is based largely on a comparison of the present position of military surgery with that prevailing at the time of World War I. In general, the wounds sustained in World War II seem to have been more severe in type but less contaminated than those met with in the trench warfare of World War I.

Burns have been observed much more frequently in the recent war. Earlier and more effectively organized surgical treatment has been provided in the forward areas, particularly with respect to resuscitation facilities. Air transport has been used on a large scale to move casualties rapidly from forward areas to completely equipped hospitals. The benefits of chemotherapy have profoundly altered the outlook and treatment of wounds, surgical infections, and certain diseases of infective origin. Significant advances have been made in the field of plastic surgery.

There is a clearer conception of the difference between shock due to burns, blast injuries, etc., with no blood loss, and shock due to wounds, in which associated hemorrhage is often the predominating factor. It is generally agreed that in both types a major factor is the reduction of circulating blood volume, which needs to be restored by treatment. Gum arabic and other substitutes have been completely discarded, with improvement in transfusion facility, the storage of blood and plasma, and in the technique.

Donors with a known history of malaria should not be used, but when they have been used it appears that atebrin treatment has protected recipients from developing infection. In cases of acute blood loss in healthy soldiers, blood can and should be given more rapidly and in larger amounts than was previously thought advisable. The application of heat externally is of doubtful value in the treatment of shock, and may do harm, as may elevation of the foot of the bed. It has been stressed that when a large artery has to be ligated, ligatures should be applied near the next upper and lower branches of the vessel in order to eliminate blind ends. The experience of World War II seems to confirm the advisability of concomitant vein ligation with ligation of a main artery in the extremities.

The necessity for early and effective excision of wounds has been amply confirmed. The external

skin wound should be enlarged, preferably in the length of the limb, the deep fascial envelope freely opened, and the removal of tissue should be directed especially to damaged, soiled, and devitalized muscle. Skin need be only sparingly removed. After excision the wound is left open or it is lightly filled with paraffin; vaseline is sometimes applied on gauze, and an external protective dressing is applied. Insufflation of sulfonamides is not so largely used as formerly. Giving the selected sulfonamide by mouth and penicillin by intramuscular injection is the method of choice in the administration of these drugs. The initial surgical treatment of wounds still calls for observance of the fundamental principles. The excised wound should be left open and should not be closed earlier than the fourth or fifth day after excision. With the combined use of penicillin and sulfonamides, closure may be accomplished earlier—in from 2 to 3 weeks—than with the use of sulfonamides alone.

Pyrexia was noted in some cases in which penicillin had been administered by continuous drip, and was observed occasionally when penicillin was given intermittently.

The results were studied in 706 wounds in which the dressing had not been disturbed from the time the patient left the casualty clearing station until his arrival at the base hospital.

The incidence of infections in these wounds was as follows:

Forty-nine per cent of wounds which had been operated upon, without the application of any bacteriostatic agent, were infected: 43 per cent of wounds operated upon, with the application of sulfanilamide powder, were infected: and 25 per cent of wounds operated upon, with the application of penicillin-sulfathiazole powder, were infected.

The author states that immobilization of the injured part is essential for comfort of the patient and the healing of wounds. This principle applies not only to fractures but also to joint injuries and severe flesh wounds. The use of a complete nonpadded plaster cast, however, is dangerous if left unopened, and the risk is greatest in closed or simple fractures. The swelling of a limb with intact skin and fascial envelope may produce great tension within the cast and lead to serious damage to the tissues. More emphasis is now placed on adequate and sufficiently maintained immobilization of fractures, and less emphasis is being placed on the early movement of joints.

A lowered mortality from burns has been achieved by replacing fluid loss and by the use of pressure bandages applied over copious dressings. It is now appreciated that the great reduction in the exposed skin surface in extensive burns, in which a large proportion of the body surface is swathed in bulky dressings, may lead to interference with the normal heat regulating mechanism of the body, especially under tropical conditions. Excellent results have been obtained by nursing burned patients in air-conditioned rooms. JOHN L. LINDQUIST, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Tabanelli, M.: Frostbites Sustained in War (Congelamenti di guerra). *Arch. ital. chir.*, 1946, 68: 111.

Of the various methods of treatment of frostbites, namely, immersion of the affected extremity in hot normal saline solution, diathermy, x-ray irradiation, periarterial sympathectomy, and a block of the perivascular sympathetic plexus, the author prefers the last one. From 10 to 20 c.c. of the customary concentration of novocain solution, or one of its derivatives, are injected in the axillary region or in Scarpa's triangle, respectively, in order to anesthetize the sympathetic plexus of the corresponding arteries.

A few minutes after the injection one can observe a local capillary vasodilatation, alleviation or complete cessation of pain, increase of the normal temperature, and disappearance of the cyanosis.

Local anesthetic block consisting of the injection of novocain without adrenalin into tissues surrounding the affected area is supposed to produce similar results.

In first degree frostbites the author obtained excellent results with anesthetic block of the perivascular sympathetic nerves. From 1 to 3 injections given at daily intervals were required to produce the desired results.

In second degree frostbites the injection of novocain into the axillary region or the femoral canal may be supplemented by an injection of from 10 to 20 c.c. of novocain into the region of the second lumbar sympathetic ganglion. After the treatment a sensation of heat in the affected area is noticed by the patient, vasodilatation is followed by relief of the pain, and the oscillometric index demonstrates an improvement in the condition. From 1 to 3 injections at 1 day intervals are usually required to obtain relief. In 5 of 56 cases of second degree frostbite, the anesthetic block of the perivasal sympathetic nerves was supplemented by an infiltration of the second lumbar sympathetic ganglion. The results of this method were very satisfactory.

In third degree frostbites surgical procedures had to be employed. Amputation or exarticulation of the hand was done in 4 cases, while similar procedures on the feet were employed in 104 cases. Among 165 similar procedures performed on the tarsal and metatarsal bones, Lisfranc's exarticulation was done 56 times and Chopart's method was employed in 10 instances. Streptosil was applied locally in every case.

Tubular pedicles used in skin transplantations gave good results in 85 per cent of the cases. In 36.6 per cent of the cases in which transplantation of derma and epidermis according to the Davis method was employed, perfect results were obtained; in 50 per cent the results were partially successful, and in the remaining 16.6 per cent failures were recorded.

In 56 cases a tendon transplantation was required to correct the varus position of the foot. The lower end of the tendon of the anterior tibial muscle alone

or together with the tendon of the extensor digitorum longus muscle was attached to the niche created in the cuboid bone. This operation was required to correct the deformity following the Lisfranc operation.

JOSEPH K. NARAT, M.D.

Watson, E. F., Hoge, W. G., and Koch, S. L.: Burns in Children. *Q. Bull. Northwest. Univ. M. School,* 1946, 20: 286.

The authors discuss the methods of therapy and the results of their endeavors in 266 patients admitted to the "Burn Project" at the Cook County Hospital. Their discussion is divided into two parts, one regarding local treatment and the other systemic therapy. Local treatment consisted of surgical cleansing, under aseptic conditions, with white soap and soft cotton, followed by dressing with a nonadherent fine mesh gauze which was covered by compression dressings. Petrolatum, bentonite, carbowax containing 10 per cent activated zinc peroxide, and penicillin were used to impregnate the gauze. The authors believe that the best results followed the use of either the penicillin gauze or the zinc peroxide carbowax gauze. Primary change of dressings was delayed for from 10 to 12 days if possible. Indications for earlier dressings were extensive saturation of the dressings or prolonged high fever. To secure clean granulating wounds for early grafting the authors found daily dressings saturated in Dakin's solution the most efficacious.

In the general treatment of the patients, sedation was given to half. This consisted in either morphine or the barbiturates. Plasma and oxygen were given to all who had over 5 per cent of the body burned. Fluids by mouth were given as soon as tolerated and augmented by vitamins and a skimmed milk mixture to maintain protein balance. Salt solution and sodium bicarbonate were given by mouth.

Seventeen, or 6.4 per cent of the patients, died. There were no recoveries among the patients who had over 50 per cent of the body surface burned. All but 2 deaths occurred within 34 hours of admission. The authors both begin and conclude with the admonition that burns are an important problem, and that their care can be undertaken only in a hospital. The best first aid is to wrap the child in a clean sheet and to bring it to a hospital for care.

WILLIAM C. BECK, M.D.

Gardner, C. E.: Air Force Battle Casualties: An Experience with Acute Injuries of 839 Battle Casualties from the Eighth Air Force. *Arch. Surg.*, 1946, 53: 387.

Air force crews in combat are subject to injury not only from enemy gunfire but also from the effects of cold or anoxia at high altitudes, from burns or injury from crash landings or parachute jumps, or from a bizarre assortment of accidents within a plane in flight, the commonest of which is being caught in a moving gun turret. Of the 839 patients whose cases constitute the basis of this report, 645 had battle wounds from missiles, 140 had battle injuries from plane crashes, 26 had battle injuries from parachute jumps, and 28 had injuries from plane accidents.

Of the 645 patients injured by missiles, 69 per cent were wounded in the extremities, 20 per cent in the head and neck, and 11 per cent in the trunk. Of the wounds of the extremities, fractures occurred in 25 per cent, neural injuries in 8 per cent, and major arterial injuries in 5.5 per cent. There was a low incidence of penetrating thoracic and abdominal wounds as compared with wounds of ground forces in the field, because of the effectiveness of body armor worn by crews of heavy bombers in combat.

Treatment was begun by the crew in the plane before it landed, after which the wounded man was seen by his flight surgeon and taken from the plane to the medical station on the field. Here first aid measures, begun on the plane, were checked and continued, and plasma was given if necessary. Patients were then transferred to the hospital, where they were received in the shock ward for resuscitation, study, and preparation for operation. Shock was treated with transfusions of whole blood. Reactions to transfusions had to be guarded against. Hemolytic reactions are more prone to follow large, multiple, or repeated transfusions. Alkalinization of the urine was carried out in an endeavor to prevent the renal damage resulting from hemoglobinemia and hemoglobinuria.

Wounds of the soft parts were treated by excising all devitalized tissue, removing foreign bodies, irrigating with isotonic solution of sodium chloride, dusting lightly with sulfanilamide powder in most cases, inserting loosely a gauze strip covered with petrolatum to the depth of the wound, and applying a voluminous dressing snugly. No harm resulted from the local use of sulfanilamide in wounds left open for later secondary suture. Healing of the wounds in which sulfanilamide was not used was not essentially different from healing of sulfanilamide-treated wounds. Sulfadiazine was given routinely by mouth until after secondary closure of the wound had been carried out. Penicillin was given to patients with major wounds. Pentothal sodium was the anesthetic used in most cases.

Wounds of the scalp, face, and all serous cavities were closed after excision. All others were left open and not dressed until 5 days later, when the patient was returned to the operating room and secondary closure was done. For associated wounds of the skeletal system requiring traction, skeletal traction was used. Where traction was not necessary, well padded plaster casts were applied. Internal or external skeletal fixation was not used. First dressings were done in the operating room 5 days after débridement, at which time the wounds were closed, if possible, by suture or skin graft.

Wounds penetrating the skull or brain were treated by scalp débridement, removal of loose fragments of skull, enlargement of the skull defect, removal of traumatized brain by suction, with special care to remove indriven bone fragments, and painstaking hemostasis, with the use of muscle packs or

fibrin foam for venous sinus tears. Dural grafts from temporal fascia, periosteum or fascia lata were usually necessary. If the bone defect was not repaired immediately with a tantalum plate, tantalum foil was usually placed between the scalp and dura to make subsequent plating easier. The wounds of the scalp were always closed. Of 25 patients, 1 with an extensive penetrating craniofacial wound from a 20 mm. cannon shell died (mortality 4 per cent). All the others made good recoveries.

Thoracic injuries occurred in 13 patients wounded from missiles. In none did the missile traverse the flak suit. Thoracotomy with the patients under ether administered endotracheally was done by an opening through the wound of entry, except in patients in whom the missile entered through the apex, and in these an anterior approach through the third interspace was used. Wounds of the soft parts were debrided, the shattered rib fragments and foreign body removed, the wound in the lung closed with sutures, the blood removed from the pleural cavity, and the wounds of the soft part of the chest, exclusive of skin and subcutaneous tissue, closed without drainage. Air was removed from the pleural cavity with a catheter or needle and 100,000 units of penicillin was introduced. Thereafter daily thoracentesis was done until the chest was dry and the lung re-expanded. There were no deaths in this series of patients. Empyema developed in one patient; in another re-expansion of the lung was not complete when the patient was evacuated to the United States; in another, in whom ligation of the subclavian artery just above the aorta was necessary, a partial clotted hemothorax was present when the patient was evacuated.

Abdominal injuries requiring laparotomy occurred in 18 patients injured by missiles. Two of these patients died (mortality 11 per cent). Injuries to the eyes occurred in 38 patients, and faciomaxillary injuries in 14. Injuries to the peripheral nerves occurred in 48 patients. Because of difficulty of detecting how widely a divided nerve is traumatized by shell fragments at the time of the original excision of the wound, nerve suture was rarely done until 3 weeks after the wound had been closed by secondary suture or graft. At this time the tantalum wire suture technique with tantalum foil cuff was used. Arterial injuries occurred in 35 patients. Vessels were ligated with either surgical gut or silk, and were transfixed. Ligation in continuity of an artery was not done. Concomitant vein ligation was done whenever a major artery was ligated. Several cases required immediate amputation because of extensive injuries to the extremities. Delayed amputations were necessary in lesions of the external iliac (1), femoral (1), and popliteal arteries (3). Arterial suture was done five times. Heparin was not available in any of the cases. Thrombosis occurred at the site of suture in both cases of popliteal lesions so that amputation became necessary.

Débrided tissue was cultured in 177 cases. Organisms of the clostridium group were present in 41.2 per cent of the cases. Infection with Clostridia welchii occurred in 2 patients and was successfully treated by amputation.

In none of the wounds of other patients did cellulitis develop, nor was infection present grossly in the wound at the time of secondary closure. In 1 scalp wound and 1 thoracic wound, both closed at the time of the original operation, localized infection developed and required drainage. Secondary closures were almost uniformly successful, and in the small number (estimated at 5 per cent) in which healing was not complete and drainage occurred, the lack of success was attributed to tension on the sutures or to dead space. Death occurred in 3 of the 645 patients injured by missiles (mortality 0.4 per cent).

Among 140 casualties resulting from crashes during combat missions, injuries of the head occurred most frequently (46 per cent). Crushing injuries to the vertebrae were the next commonest lesion, most of which were multiple. Burns occurred in 14 patients. The mortality in this group of 140 patients was 10.7 per cent. In most, the immediate cause of death was thought to be an injury of the head.

There were 26 casualties as a result of injury in parachute jumps; none of the patients died. Of 28 patients who were injured within the plane during combat, 2 died. Both were tail gunners who suffered severe injuries of the head when struck by an unexploded bomb dropped from above.

JOHN L. LINDQUIST, M.D.

Hardy, S. B.: Rehabilitation of the Injured Hand. *Am. J. Surg.*, 1946, 72: 352.

Surgery in connection with the treatment of the injured hand is difficult and many times, after long hours of labor, the results are disappointing. The author states that that is no reason to assume an attitude of dislike or discouragement, or to pass off all cases of hand injury as though they were something to be accepted and for which little could be done except in only a very few selected cases.

The hand injuries seen here in America are old, of course, and most of them are healed wounds. They have been treated at other stations along the line and have been sent back for definitive treatment. In the discussion, the author refers, in the main, to this type of hand and its rehabilitation.

In deep burns of the hands there is an involvement of the tendons and joint capsules as well as the skin, and, with subsequent contracture, this produces the typical burn contracture deformities of the hands with hyperextension of the metacarpophalangeal joints, flexion of the first interphalangeal joint, and, usually, hyperextension of the distal joints of the fingers. Contractures develop across the web spaces and prevent abduction and adduction of the fingers and thumb. Thus, the hand is bound in a rigid covering which, in time, becomes more contracted and allows less use of the joints. Certainly, it is desirable to treat these hands as early as possible after the initial injury and to supply

a good skin covering at the earliest moment, rather than to allow them to granulate and develop extensive contractures or to allow healed scarred epithelium which is tense and thin to become excoriated with secondary ulceration.

Contracture of the hand due to various etiology—lacerations, penetrating objects, shrapnel and bullet wounds, in which soft tissue is the primary tissue injured and in which heavy scar develops with healing—may be superficial and involve only the skin and subcutaneous tissue of the hand, or it may extend deeper and involve all the soft structures underlying it, including the tendons, joints, and nerves. Usually the condition is not relieved permanently by conservative treatment and surgery is ultimately required.

Many of the patients, fortunately, have only one or two digits, or merely parts of digits traumatically amputated, and a useful hand can be obtained with the remaining digits if the amputation stumps are covered satisfactorily. Usually the skin over the stumps is thin and atrophic, or painful neuromas are present which prevent even light pressure on these areas. Frequently, because of pain, a patient will not use the other remaining functioning digits of his hand with resulting joint stiffness which further increases his disability. Surgery will relieve these conditions and even apparent lengthening of a short deformed digit can be obtained by deepening the adjacent web spaces.

A number of the injuries seen are produced by sharp penetrating objects which have healed more or less per primam but in which the original injury has divided the tendons, either flexors or extensors. In the treatment of wounds in the field it is impractical to do primary tendon repair, and, frequently, because the wounds are dirty, it is inadvisable to repair them later at the station hospital even should the patient arrive within 12 hours, the socalled relatively safe period for primary tendon repair. This condition is amenable to treatment and an attempt should be made to restore function by the surgical procedure of secondary tendon repair with a tendon graft. A technique of tendon grafting is described.

All wounds of the hand, if left open, are contaminated, but fortunately most of them heal without apparent extensive infection. There is a group of cases in which virulent infectious processes develop with destruction of tissue and resultant deformities, many of which are contracture deformities of a general nature. The infectious process destroys the smooth gliding action of the tendons and joints, disturbs general nutrition, and the entire hand becomes painful and useless as far as function is concerned.

There is a large group of combat injuries in which the injury is extensive and all the various tissues are involved to a greater or lesser extent. These cases are combination problems of orthopedic, plastic, and neurosurgery, and the problem is one of restoring all remaining structures to as near a functioning status as possible. Extensive surface scarring is usually present and the circulation is impaired. It is necessary to replace the surface covering with a pedicle graft after the scar has been excised. This improves the general condition of the hand. The orthopedic and neurosurgical problems should be corrected before the final tendon reconstruction is undertaken.

In evaluating the extent of damage of an injured hand, a history of the condition together with the previous treatment is essential. This takes time and patience on the part of both surgeon and patient, and frequently a hasty diagnosis as to the condition becomes disappointing to both surgeon and patient alike when the end-results are tabulated.

It is of paramount importance to make a very careful examination of the entire extremity as well as the injured hand. Local signs may have remote causes. The general condition of the hand should be observed, including the circulation, the general state of nutrition, and the atrophic changes. The general picture should then be outlined. Each part of the hand is checked separately for motion, pain, and sensory disturbance. X-ray examination is imperative to check bone changes and deformities. The disability is noted and studied, and the anatomical basis for it worked out. This is important from the standpoint of diagnosis and evaluation and, also, from that of its correction. When one is able to visualize the pathological condition, one is able to outline the procedure to be followed in the rehabilitation of the hand and to give a prognosis. The author believes there is no justification for subjecting a patient to the ordeal of an operative procedure which is long, laborious, and will offer him only little possibility of improvement. By reviewing the condition carefully, the surgeon is able to avoid this in most cases. If the hand is nothing more than a nonfunctioning mass of painful scarred tissue resulting from wounds and subsequent infection, one would be performing a surgical feat rather than a sound surgical procedure to even attempt to rehabilitate it. Perhaps, amputation with prosthesis would be the solution.

After elective operative procedure is decided upon, certain preoperative care is necessary. The original injury must be well healed. No induration or reaction of tissue to healing should be present. In the case of a tendon injury, 3 to 6 months should elapse before secondary repair. In cases in which heavy scarring is binding and acts as a constriction—a condition which interferes with nutrition—a preliminary operation is necessary in which the scar tissue should be removed and good tissue covering supplied in the form of a pedicle graft. The patients should be encouraged to take occupational therapy also as an adjunct to physiotherapy.

Hand surgery is always difficult even when optimum operative conditions are available. Good lighting is necessary. General anesthesia is the anesthetic of choice. It is essential to provide a bloodless field in which to work and not to damage important structures, as well as to aid in making a

clean anatomical dissection. An Esmarch tourniquet is used to express the blood in the hand and forearm before inflating the cuff. While the Esmarch tourniquet is in place, the blood pressure tourniquet is inflated to between 240 to 260, and, after clamping each tube to secure the pressure, the Esmarch tourniquet is removed and the operation is started.

Incisions are made in the hand along the flexion creases and not over points of pressure. Mid-lateral incisions are made along the digits. Good exposure should be obtained. It is extremely important to be gentle in retracting skin flaps and in handling normal structures in order not to traumatize the tissue, thus minimizing the formation of postoperative scarring. All scar tissue should be removed.

If extensive scar tissue is present and the skin is adherent to underlying structures, a pedicle graft is used to cover the defect after excision of the scar. This provides a good covering and subcutaneous fat under which tendons can glide and also healthy tissue to replace the scar, thereby improving the general nutrition of the hand. Subsequent operations for nerve work or tendon grafting can then be approached through healthy tissue. After the dissection is complete, the tourniquet is released. It is well to remember that after release of the tourniquet pressure should be maintained on the wound with moist sponges for 5 minutes because of the initial hyperemia. This saves unnecessary clamping of oozing points and then only active bleeders need be secured. After the operation is completed, careful closure of the wound is necessary. A pressure dressing is always necessary in hand surgery to prevent undue oozing and to prevent hematoma from developing postoperatively. This can be accomplished by applying fine meshed gauze to the surface of the wound and fluffed gauze which can be compressed with gauze bandage. If fixation of the part is necessary, a molded plaster or metal splint can be applied.

Elevation of the limb postoperatively for any surgery done on the hand is essential in order to minimize postoperative discomfort and swelling. Inspection of the wound can be done from 7 to 10 days after operation by opening the bandages without disturbing the hand and forearm from its splint. Sutures can be removed at this time and the dressing folded together again and rebandaged. Elevation of temperature, and pain and throbbing sensations in the hand call for inspection at any time.

In the case of tendon work, fixation of the hand in plaster for 3 weeks, without motion, is maintained and support is then given by elastic bands. The patient is encouraged to move his hand actively immediately after its removal from the cast with elastic traction used as a safeguard against sudden pull on the healing structures. Occupational therapy to engage the patient in intricate manipulative work and hand exercises, and good physiotherapy with the patient's full co-operation are essential for good results.

Rehabilitation of the injured hand is in most instances probably one of the most difficult tasks which the surgeon is called upon to perform. By careful examination and planning, together with meticulous surgery, this work can be accomplished with satisfactory results in many cases. Good co-operation on the part of the patient in taking active hand exercises and following physiotherapy treatments is most essential for good results.

JOHN E. KIRKPATRICK, M.D.

Shambaugh, P.: Postoperative Wound Infections—An Evaluation of Factors Concerned with the Resistance of the Tissues to Infection. *Q. Bull. Northwest. Univ. M. School*, 1946, 20: 276.

The factors which have been ascribed as lowering tissue susceptibility to infection are senility, the use of irritating suture materials, imperfect hemostasis, and physical and chemical trauma. The author believes that this opinion has been accepted empirically, without substantial clinical or experimental proof, and has undertaken to apply investigative methods to determine its soundness. He thinks that senility has rightly been accused of lowering tissue resistance to infection, as the percentage of suppurating wounds in a series of 2,360 controlled herniorrhaphies was 30 per cent higher in the patients over than in those under 50 years of age.

Experiments are cited to show that wounds closed with catgut are more liable to wound infection than those sutured with silk. The author finds no appreciable difference between silk, cotton, and possibly steel wire, although the last appears to be the most advantageous from the standpoint of infection. Furthermore, he finds no difference between treated and untreated silks. Nylon is dismissed because of the difficulty in retaining knots.

Imperfect hemostasis as a cause of reduced tissue resistance is discussed in some detail, and several experiments are reviewed. The author thinks that blood itself is not a good culture medium unless some chemical irritant has been added. A table of Fleming's is quoted to show that leucocytic activity is maintained in hematomas for only 2 days, after which there is a precipitous decline in such activity. Therefore, after this period the evacuation of hematomas may be fraught with a certain amount of danger if bacteria are thereby introduced. The introduction of serum into a wound, however, was associated with a high percentage of wound infection.

Desiccation by drying wounds under a lamp, surprisingly, did not reveal any increase in the incidence of wound infection. Experiments with various bactericidal agents introduced into grossly contaminated wounds, revealed that they are largely inefficacious and may even be harmful. Simple lavage with physiological salt solution appeared to be of some value in grossly contaminated wounds, but only to the extent of removing particulate matter, not in effecting any sterilization of the tissues. Soap solutions and other stronger bactericides probably produce an adverse effect because of their inhibitory or lethal influence on polymorphonuclear leucocytes.

WILLIAM C. BECK, M.D.

ANESTHESIA

Nicholson, M. J., and Eversole, U. H.: Neurological Complications of Spinal Anesthesia. *J. Am. M. Ass.*, 1946, 132: 679.

Headache, septic and aseptic meningitis, arachnoiditis, neuritis, myelitis, and the cauda equina syndrome have been the complications most frequently reported following spinal anesthesia.

These cauda equina complications are generally brought to the anesthesiologist's attention because the patient fails to regain the use of his lower extremities at the usual time. Loss of motor and sensory function is generally found to involve the lumbosacral nerve distribution. The loss of bowel and bladder function is the most ominous part of the entire clinical picture, and the return of function, when it occurs, is extremely slow.

The clinical manifestations of the lesions of the cauda equina might be explained by damage to the lumbosacral region of the cord, to the conus medullaris, or to the nerves of the cauda equina, but it seems more probable that the maximal damage is to the latter. A résumé of several possible ways in which such damage might occur follows:

1. Direct trauma as the sole cause of the anesthetic complication can fairly well be eliminated because of the thousands of diagnostic lumbar punctures that have been performed without any similar complication.

2. The rapid onset of most of these complications seems to preclude infection as an etiological factor.

3. It seems that only those nerves exposed to the greatest concentration of the drug are affected. The lesion is maximal in those roots of the cauda equina which are closest to the place where the drug was injected.

4. Another consideration is the possibility that spinal anesthesia may act as a precipitating factor in the evolution of certain pre-existing neurological affections.

It is almost impossible to determine from the literature the true incidence of neurological complications following spinal anesthesia, since the reports show great variation. There have been 21,000 patients at the Lahey Clinic who have received tetracaine hydrochloride for spinal anesthesia since 1934. Five neurological complications resulted. In 3 cases lesions of the cauda equina type developed and in 2, the patients were later found to have a cerebrospinal fluid block from metastatic carcinoma. Two patients developed a peroneal neuropathy. In addition, 2 patients in whom postspinal neurological disturbances developed and who were suspected of having permanent sequelae were found on further investigation and operation to have been suffering from tumors of the spinal cord.

There is a report of 13 cases in which neurological complications developed after spinal anesthesia. A detailed regimen for the prevention of postspinal neurological complications is presented.

A patient who shows a delay in the return of motor and sensory function following spinal anesthesia should be considered for emergency treatment and warrants immediate attention. Certain of these complicated cases may require special and intensive treatment before the patient can be rehabilitated.

MARY FRANCES POE, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

List, C. F., and Hodges, F. J.: Angiographic Diagnosis of Expanding Intracranial Lesions by Vascular Displacement. *Radiology*, 1946, 47: 319.

The authors discuss the changes encountered in 136 cases of space occupying intracranial lesions as studied by means of carotid (or vertebral) angiography. The method, which has proved to be reliable and safe, is indicated in certain expanding lesions of the base of the brain and skull, and of the cerebral hemispheres and is of special value for the differentiation of neoplasms and vascular processes.

The type of vascular displacement depends on three variable factors, viz., the location, size, and pathological type of the lesion. In epicerebral expanding lesions, such as epidural or subdural hematoma, the cortical vessels are displaced and separated from the convexity of the skull by an interposed area devoid of vessels. This is characteristically demonstrated only on the anteroposterior film, which gives an "optic cross section" of the lesion (Fig. 3). In circumscribed superficial tumors, e.g., meningioma, an area of spread and displaced vessels is surrounded by a corona of crowded but otherwise normal blood vessels. Here again the anteroposterior view may more graphically portray the extent of the lesion in depth than the lateral projection (Fig. 4). If a tumor is diffusely infiltrating, deeply located, and accompanied by considerable swelling of the surrounding brain, the vessels, especially the arteries, are spread and stretched over a wide area.

Any sizable enlargement of a cerebral hemisphere causes shifting of the midline structures such as the anterior cerebral artery. Normally, this vessel keeps in the midline or transgresses it over short stretches only if it happens to possess great physiological tortuousness. The changed position of the anterior cerebral artery often is not quite so sensitive an indicator of an expanding hemispheral process as in the midline shift of the ventricular system. Obvious displacement of the anterior cerebral artery per se does not reveal a specific localization of the space occupying lesion. Since the rigid falx resists the pressure of an enlarged hemisphere, the upper medial edge of the hemisphere is less displaced than the lower and anterior parts in the midline plane, which tend to shift underneath the falx. This is shown by a definite notching of the anterior cerebral artery around the lower edge of the falx. (Fig. 3).

Ventricular enlargement cannot be recognized in angiograms with the same precision as in ventriculograms: in fact, it can be diagnosed only by indirect evidence. Internal hydrocephalus produces elevation and rounding out of the anterior half of the anterior cerebral artery without midline shift. This is explained by the elevation of the corpus callosum, the contour of which is marked by the pericallosal artery. In extreme hydrocephalus, also, the arteries of the convexity appear to be stretched, with the sylvian vessels taking a straight diagonal course.

Even small tumors of the base of the brain can be diagnosed. The main reason for resorting to angiography in these cases is the necessity of differentiation from aneurysms originating from the carotid, basilar, or vertebral arteries or from the circle of Willis. Furthermore, the relationship of the tumor to the large arteries of the base can be well demonstrated by angiography, a significant aid in determining the operability of the lesion. Since many basal tumors attain only moderate size, they displace the adjacent larger arteries without changing the configuration of intracerebral vessels.

Extradural tumors arising from the sphenoid bone (sarcoma), the sphenoidal sinus (carcinoma, mucocele), or from the depth of the sella turcica (pituitary adenoma) elevate the extradural (subclinoid, parasellar, intracavernous) portion of the internal carotid artery and displace it laterally (they may compress the vessel considerably and thereby prevent a proper filling of intracerebral vessels).

Parasellar tumors, often meningiomas, open up the first curve of the carotid siphon by flattening and depressing the extradural portion of the carotid artery and by vertical elevation (anteromedial displacement) of the supraclinoid segment of the carotid. Thus, the intradural supraclinoid portion of the carotid appears unusually erect and elongated.

Suprasellar tumors (meningioma, adenoma of the pituitary, craniopharyngioma) likewise elevate the supraclinoid portion of the carotid, but, in contrast to parasellar tumors, tend to displace the vessel laterally and do not significantly widen the first curve of the carotid siphon. In addition, these lesions characteristically displace the first segment of the anterior cerebral artery upward and slightly laterally. As a result, the beginning of the anterior cerebral artery forms a downward concave arch above the lesion. Far advanced pituitary adenomas with extradural, parasellar, and suprasellar extension may show a combination of angiographic signs of the three groups described.

Tumors of the petrous apex and of the retrosellar region may grow both into the middle and posterior fossa. If the lesion is extradural, e.g., a chordoma, the carotid is compressed and elevated in its extradural retrosellar course. If the tumor is intradural (meningioma, epidermoid), the angiographic signs are those of a parasellar or basal temporal lobe lesion.

In tumors of the posterior fossa ventriculography is the method of choice. In extramedullary lesions of the ninth, tenth, eleventh, and twelfth nerves, vertebral angiography has some value in that neoplasms in this region are difficult to demonstrate and they may be differentiated from an aneurysm of the vertebral artery.

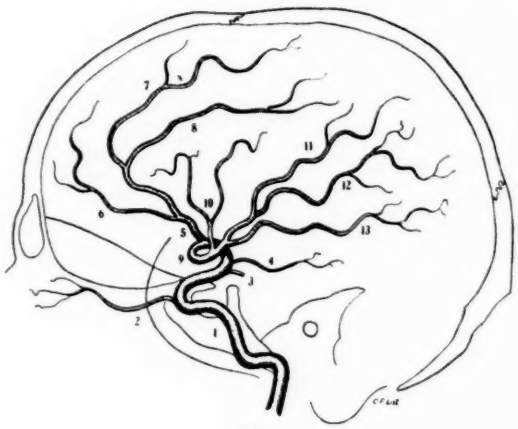


Fig. 1

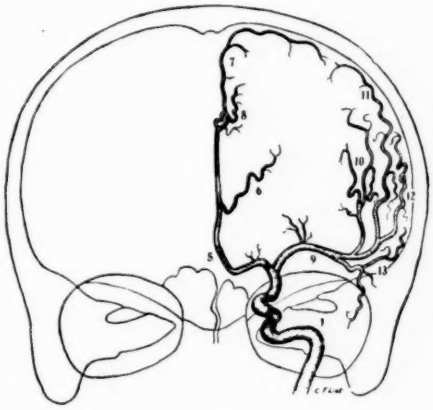


Fig. 2

Figs. 1 and 2 (List and Hodges) Schematic drawings of normal arteriograms obtained by injection of the internal carotid artery. Arteriograms in lateral and anteroposterior projections. 1. Internal carotid artery. 2. Ophthalmic artery. 3. Posterior communicating artery. 4. Anterior choroidal artery. 5. Anterior cerebral artery. 6. Frontopolar artery. 7. Callosomarginal artery. 8. Pericallosal artery. 9. Middle cerebral artery. 10. Ascending frontoparietal artery. 11. Posterior parietal artery. 12. Angular artery. 13. Posterior temporal artery.

In temporal lobe tumors the pathognomonic sign is elevation of the sylvian vessel. In the lateral view, the arteries of the middle cerebral group are displaced upward; in the anteroposterior projection, they appear also to be shifted medially, away from the bony contour of the temporosphenoidal convexity. Thus the distance between the anterior and middle cerebral arteries is reduced in both the sagittal and frontal plane. The anterior cerebral artery is displaced across the midline without losing its normal tortuousness and without deformation of its frontopolar branch. For descriptive purposes the temporal lobe tumors will be considered under two headings: tumors of the anterior part, and tumors of the posterior part.

The group of anterior temporal lobe tumors comprises meningiomas of the middle fossa arising from the wing of the sphenoid and gliomas of the temporal pole extending to the hippocampal uncus.

Meningiomas at the inner part of the sphenoidal wing and anterior clinoid process behave like large parasellar tumors and show the corresponding angiographic signs. In addition, they elevate the beginning of the middle cerebral artery. Meningiomas of the external two-thirds of the sphenoidal wing encroach upon the anterobasal part of the temporal lobe and also, to a variable degree, on the posteroinferior part of the frontal lobe. On lateral arteriograms these cases show the first curve of the carotid siphon widely open or even flattened to 180 degrees, with the supraclinoid segment of the carotid and the middle cerebral artery taking a straight vertical course upward. Occasionally there may be compression or even partial occlusion of these vessels by the adjacent neoplasm. The middle cerebral group then makes a rectangular turn, continuing horizontally in a plateaulike fashion; the terminal branches, however, resume their normal diagonal course. On the anteroposterior projection the elongated supraclinoid portion of the internal carotid appears displaced medially; the bifurcation into the anterior and middle cerebral arteries forms a characteristic "V". On venograms, the superficial sylvian vein and the anterior segment of the anastomotic vein of Labbe may be sharply elevated. Gliomas of the anterior part of the temporal lobe exhibit a similar picture, although the stretching of the carotid and middle cerebral artery is not as extreme and the backward turn of the sylvian group is more gradual and rounded. Small superficial vessels, the anterior temporal artery or forward branches of the posterior temporal artery, may be stretched over the convexity of the lobe. If the tumor invades the hippocampal region, the anterior choroidal artery—a fairly constant direct branch of the internal carotid—is considerably stretched and displaced medially and upward. In anteroposterior arteriograms the typical V-shaped angle between the anterior and middle cerebral arteries may be observed also. On venograms, the engorged vein of Labbe is elevated in a wide semicircle and may project above the level of the vein of Galen, instead of below, as normally.

Posterior temporal lobe tumors, most of which are gliomas, do not deform the carotid siphon and the first segment of the middle cerebral artery, but they markedly elevate the branches of the sylvian group. On lateral arteriograms the entire sylvian group forms an arc whose upward convexity may lie almost at the level of the pericallosal artery. Tumors situated close to the lateral surface of the lobe pro-

duce stretching and separation of the angular and posterior temporal arteries and their branches. In the anteroposterior projection, the position of the carotid remains unchanged and the bifurcation into the anterior and middle cerebral arteries has the configuration of a rectangular compressed "U".

Tumors of the occipital lobe and adjoining posterior inferior part of the temporal lobe show less characteristic angiographic signs. In lateral arteriograms, moderate elevation and forward crowding of the angular and posterior temporal arteries may be seen. The terminal branches of these vessels are definitely spread and distended, as are the arborizations of the posterior cerebral artery, provided that vessel is filled. More anteriorly, the compressed arteries of the sylvian group exhibit a tendency to coil together. On the anteroposterior projection, the midline shift of the anterior cerebral artery is slight or even absent. The vein of Labbe may be shifted downward and anteriorly.

Space-occupying lesions of the frontal lobe deform to a variable degree the supraclinoid segment of the internal carotid artey, the anterior two-thirds of the anterior cerebral artery and its branches, and the beginning of the middle cerebral artery with its frontal ascending (rolandic) branches. The most characteristic sign of all unilateral frontal tumors is the considerable displacement and localized stretching of the anterior cerebral artery to the opposite side. As a rule, this midline shift is more marked in frontal neoplasms than in hemispheral tumors of any other location.

Representative of the subfrontal tumors are the meningiomas of the olfactory groove. These usually large neoplasms arise from the floor of the anterior fossa and compress the orbital surface of the frontal lobe and suprasellar region: they show bilateral more often than unilateral development. On arteriograms taken in lateral projection, the suprasellar and subcallosal segments of the anterior cerebral artery are displaced upward and posteriorly, forming an anteriorly concave arc around the lesion (Fig. 5). In large tumors, the supraclinoid portion of the carotid and the pericallosal knee of the anterior cerebral artery may be pushed backward. Unilateral olfactory groove meningiomas displace mainly the subcallosal portion of the anterior cerebral artery to the opposite side (Fig. 6).

The group of prefrontal tumors comprises mainly astrocytomas and meningiomas (arising from the anterior portion of the falx and superior longitudinal sinus). On lateral arteriograms the carotid siphon and the beginning of the sylvian vessels are pushed slightly backward and downward. The anterior cerebral artery is displaced backward so that the curve of the vessel around the knee of the corpus callosum is blunted without losing its forward convexity. The smaller forward branches of the anterior cerebral

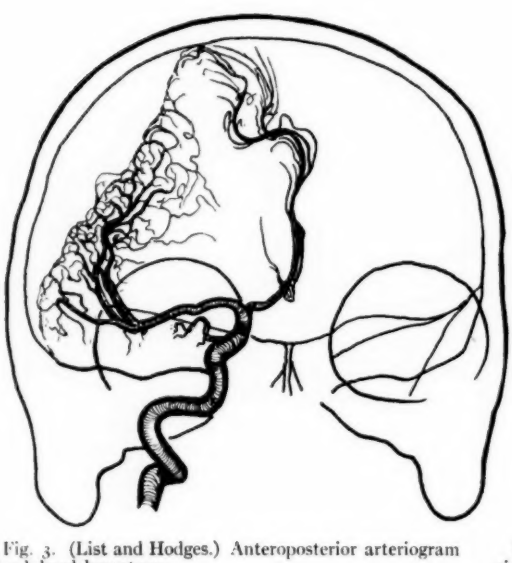


Fig. 3. (List and Hodges.) Anteroposterior arteriogram of subdural hematoma.

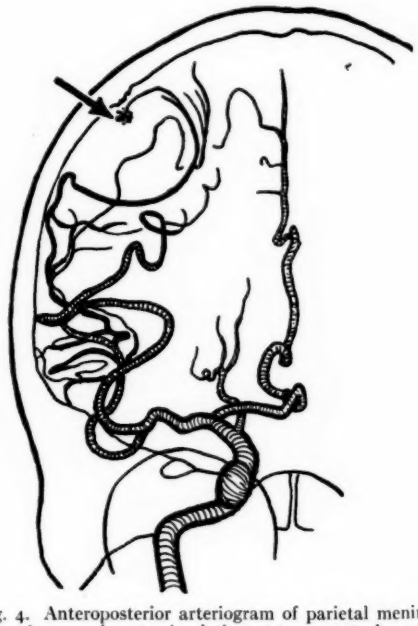


Fig. 4. Anteroposterior arteriogram of parietal meningioma. Arrow points to circulation at tumor attachment.

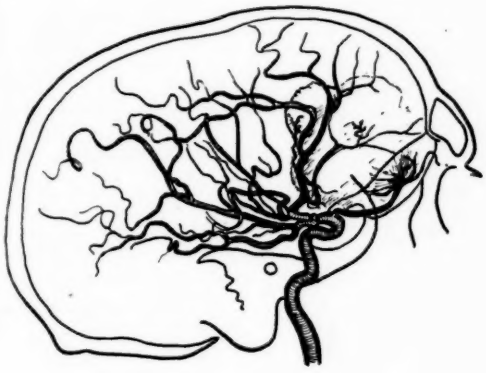


Fig. 5

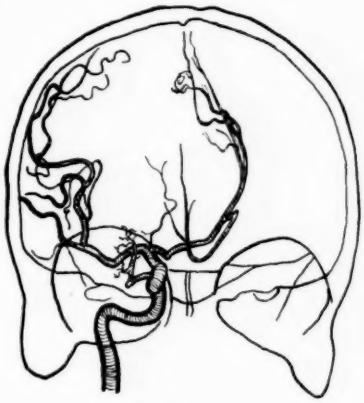


Fig. 6

Figs. 5 and 6. Arteriograms of sarcomatous olfactory groove meningioma, lateral and anteroposterior projection.

artery appear distended and spread apart. Much more impressive changes are observed in anteroposterior projection. There is major displacement of the anterior cerebral artery across the midline underneath the free edge of the falx and, in contrast to most other hemispheral tumors, the distance between the anterior and middle cerebral arteries is greatly increased. The subcallosal and pericallosal portions of the anterior cerebral artery form a smooth, round bulge and, due to stretching, the extended frontopolar branch leaves the main vessel without undulation. Diagrammatically, the figure outlined by the carotid bifurcation, and the anterior and middle cerebral arteries resembles an open "O".

Premotor tumors such as the astrocytomas, oligodendrogliomas, and meningiomas, are commonly encountered. The carotid siphon, as seen in the lateral projection is compressed, sometimes forming an apparent sharp angle anteriorly. Instead of following a normal diagonally ascending direction, the initial portion of the sylvian group is depressed, taking a horizontal or even downward convex course. It is important to observe the configuration of the ascending frontoparietal artery. This vessel, which has roughly the shape of the Greek letter Ψ (psi), is difficult to trace in the normal brain, because of its redundancy. In premotor tumors, the frontoparietal artery is displaced downward and posteriorly, with its terminal branches separated. The anterior cerebral artery may be depressed in its supracallosal segment and the callosomarginal branches separated if the lesion is in parasagittal location, but the polar vessels show little or no spreading. The angiographic picture revealed by the anteroposterior projection is similar to that of prefrontal tumors, with the exception that the principal midline shift occurs a little higher, at the knee of the anterior cerebral artery, which is projected just below the edge of the falx.

In cases of frontotemporal tumors one observes meningiomas of the lesser sphenoidal wing growing underneath the frontal lobe into the beginning of the sylvian fissure, glioblastomas of the posterior inferior frontal and opercular regions, and diffuse astrocytomas. In the lateral projection the supraclinoid portion of the carotid forms with the middle cerebral artery a straight, diagonally ascending line. The sylvian group continues in the same direction, or is as often a little elevated or depressed. The ascending frontoparietal artery is markedly stretched, and its two widely separated terminal branches form a triangular pattern. Due to the stretching of the sylvian vessels, the origin of the anterior cerebral artery is projected clear from superimposed vascular shadows. The pericallosal curve of the anterior cerebral artery is elevated and widened (similar to the picture seen in hydrocephalus). In the anteroposterior projection the anterior cerebral artery exhibits the bulge across the midline typical of frontal tumor; the middle cerebral artery may have a tendency to diagonal elevation, as is observed in tumors of the temporal lobe. On venograms, the internal cerebral vein may appear displaced upward and posteriorly. Space occupying lesions of the parietal lobe depress the sylvian vessels and the pericallosal artery. Thus, the distance between the anterior and middle cerebral systems appears to be reduced in the lateral projection. There is only moderate midline displacement of the posterior part of the anterior cerebral artery because the resistant falx yields little to pressure; yet there may be characteristic notching of the anterior parts of the vessel underneath the falx. In parietal tumors, poor filling of the terminal cortical arteries has been observed. Presumably, the intravascular pressure of the injection is insufficient in the smaller branches to overcome the compression by the tumor.

Neoplasms of the superior parietal region (parasagittal meningiomas, gliomas) depress and sometimes separate the pericallosal and callosomarginal arteries. The vessels of the sylvian group may not be much deformed, except for separation of the terminal branches of the posterior parietal and angular arteries. Inferior parietal tumors, commonly glioblastomas, depress considerably the sylvian vessels but displace little or not at all the anterior cerebral artery in the vertical plane. In the lateral projection, the sylvian group appear compressed and take an unusual horizontal or downward convex course instead of the normal diagonal fanlike arrangement. The terminal branches (anterior and posterior parietal and angular arteries) leave the sylvian group almost at right angles and ascend vertically, being widely separated from each other. On venograms, some separation of the superior cerebral veins may be noted, and the vein of Labbe may be displaced downward.

In tumors of the basal ganglia and thalamus a presumptive diagnosis can be made when there is evidence of moderate hydrocephalus with the anterior cerebral artery remaining in its normal midline position. In certain lesions of the basal ganglia, however, this vessel describes an unusual forward and upward bulge similar to that observed in posterior inferior frontal tumors. If the small arteries of the anterior perforate space (lenticulostriate and lenticulo-optic vessels) are visible in the anterioposterior film, they appear stretched and displaced laterally. The anterior choroidal artery may be seen displaced downward and posteriorly, describing a semicircle around the optic tract and pulvinar. This is almost a pathognomonic sign for thalamic neoplasm, but unfortunately the choroidal vessel is not always visible. FRANK L. HUSSEY, M.D.

Mannheimer, B.: The X-Ray Appearances of Pharyngeal Palsy. *Brit. J. Radiol.*, 1946, 19: 383.

Fluoroscopic examination of the pharynx during attempted deglutition of thick barium paste reveals the following characteristic findings:

1. Atonic enlargement of the pharynx.
2. Retention of large quantities of barium in the pyriform sinuses and epiglottic valleculae.
3. Smooth tapering of the barium column at the junction of the pharynx and esophagus.
4. Normal first or "oral" phase (passage of bolus into oropharynx), but absence of the active second phase (passage through pharynx into esophagus).
5. Failure of the larynx to close during deglutition with consequent aspiration of the barium into the trachea.

6 Absent, feeble, or irregular movements of the hyoid bone during swallowing as determined by kymographic study.

Other points favoring but not diagnostic of paralysis are:

1. Sudden onset of severe dysphagia, almost complete inability to swallow solids after an illness of short duration.
2. Regurgitation of food through the nose.
3. Complete absence of pain in spite of severe dysphagia.
4. Roentgenographically normal trachea and retropharyngeal space.

The author reports 2 cases that were referred to the x-ray department with a clinical diagnosis of possible malignancy. The characteristic findings were observed in both cases. The final diagnosis was pharyngeal palsy due to bulbar paralysis.

R. B. LEWIS, M.D.

Rakofsky, M., and Knickerbocker, T. W.: Roentgenological Manifestations of Primary Pulmonary Coccidioidomycosis. *Am. J. Roentg.*, 1946, 56: 141.

The organism, coccidioides immitis, is endemic primarily in California and to a lesser extent in Arizona and Texas. This organism exists in two forms: a vegetative phase which exists in nature, and a parasitic spore which is found in the tissue of the host. It is not transmissible from man to man.

Primary coccidioides manifests itself in two stages. In the first stage the clinical picture is one of an upper respiratory infection with cough, fever, chest pain, erythema nodosum, and positive pulmonary roentgenograms. This clinical picture endures from 3 to 6 weeks, and usually the patient recovers.

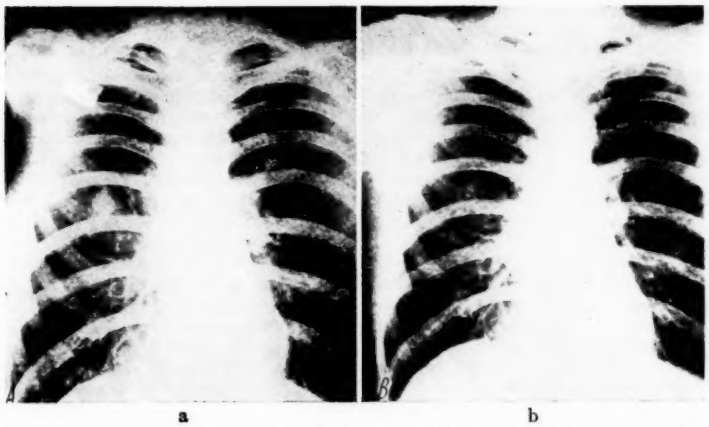
In a few cases, over a period of years, the disease may become secondary with skin and bone lesions, or, within a matter of weeks, may assume a fulminating character, ending fatally with a miliary or meningeal picture. The mortality of chronic coccidioides is 50 per cent.

Fortunately, most cases of coccidioides remain in the first stage. The dark skinned race, entering an endemic area for the first time, is found to be most susceptible. Many of these cases are found to progress into the stage II type. The only residual of the stage I group is a positive skin test which may persist as long as 20 years.

The pulmonary roentgen picture consists of nodules, peribronchial infiltration, confluent consolidation, pleural effusion, hilar adenopathy, and cavitation.

1. Nodules occur either unilaterally or bilaterally, anywhere in the lung. Their size varies from 5 mm. to 2.5 cm. The nodules either resolve in a few weeks or become fibrosed.
2. Interstitial or peribronchial inflammation occurs in hilar or basilar regions.
3. Confluent consolidation occurs anywhere in the lungs and resolves somewhat slowly. Pleural effusion may also be present.
4. Hilar adenopathy is associated with peribronchial infiltration.
5. Cavities are thin walled in the periphery of the lung fields with parenchymal involvement and resolve within 8 weeks.

The pulmonary roentgen picture is one of a combination of the described findings. They may be out of proportion to the clinical picture.



a b

Fig. 1. (Rakofsky, M., and Knickerbocker, T. W.) The nodular lesion. History and clinical features: White, male, aged 30; had never previously been in California or Arizona. Admitted on October 26, 1943, with chest pain, cough, malaise and mild fever. Coccidioides (1:100) skin test was positive. Eosinophiles 13 per cent; sedimentation rate 26 mm. Complement fixation test strongly positive.

Roentgen findings: a, November 1, 1943. Roentgenogram shows a 2 cm., single, homogeneous nodule in the right midpulmonary field; edges are well defined. There is associated peribronchial thickening and haziness at the right cardiophrenic angle. Note the smaller sharply circumscribed nodule of slight density at the periphery of the left midpulmonary field. b, December 27, 1943, shows beginning and partial clearing of the previously described nodule in the right midpulmonary field. The right cardiophrenic angle has cleared. The smaller nodule on the left is still present. Disposition: return to duty.

Diagnosis is made on the basis of a history of exposure, erythema nodosum, eosinophilia, positive skin test, positive complement fixation, precipitation tests, positive chest roentgenograms and, in the final analysis, isolation of the spores from the sputum by culture.

A series of 60 cases of coccidioides is reported. Twenty-five were of the dark skinned race with low resistance. Autopsy findings in 2 of the cases are described. One was a rather unusual case of active tuberculosis and coccidioidomycosis.

MAURICE D. SACHS, M.D.

Lenz, M.: Tumor Dosage and Results in Roentgen Therapy of Cancer of the Breast. *Am. J. Roentg.*, 1946, 56: 67.

Two hundred and six cases of breast carcinoma in which roentgen therapy was the method of treatment, were used as a basis for the present study by the author.

From 1923 to 1929, 78 patients received postoperative irradiation; the tumor dose ranged from 300 to 2,300 roentgens. Medium low voltage (130 k.v.) was used to the chest wall and axilla, the supraclavicular regions, and the opposite axilla. The dose was repeated within 2 to 3 months. This treatment was found to be inadequate. Eight patients showed skin metastases. The survival rate was not dependent on treatment but on the preoperative extent of the lesion.

Results with increased voltage have not been encouraging. Therefore, roentgen therapy following mastectomy is given only when residual or recurrent tumor is still present.

From 1933 to 1937, 38 patients received irradiation preoperatively and 44 received irradiation alone. The tumor dose was 4,500 roentgens. High voltage (200 k.v.) and tangential fields were used. All of the patients (82) had involvement of the axilla. Skeletal or lung metastases were present in 18 per cent of the 44 patients treated with irradiation alone. Only 1 patient survived 5 years. The resolution of the primary lesion following irradiation did not influence the course of the disease. In spite of the high tumor doses (4,500 r.) given, tumor cells were still demonstrable in the studied specimens.

From 1938 to 1941, 46 patients who had not been operated upon were given a tumor dose of 6,000 roentgens, or more. Sequelae, due to the high dose, were minor and were not permanent. In 23 of 31 patients, the breast tumor and axillary tumor disappeared; 10 of these patients were living and well 5 years later.

Radical mastectomy, wherever possible, is still advocated as the treatment of choice. Criteria as to operability are those postulated by Haagensen and Stout of the Presbyterian Hospital, New York. If the lesion is inoperable, it is advisable to give a tumor dose of above 6,000 roentgens to the breast and axilla. Breast cancers with axillary involvement should be classified as operable or inoperable rather than temporizing with preoperative and postoperative plans of roentgen irradiation.

MAURICE D. SACHS, M.D.

Fariñas, P. L.: Retrograde Abdominal Aortography. A Contribution to the Study of the Abdominal Aorta and Iliac Arteries. *Radiology*, 1946, 47: 344.

The technique of retrograde abdominal aortography is simple. The femoral artery is exposed by blunt dissection under local anesthesia at the level of Scarpa's triangle; a trocar 1.5 mm. in diameter is inserted, and 50 c.c. of a 70 per cent diodrast solution are injected in 2½ to 3 seconds. A tourniquet at the root of each lower extremity prevents the passage of the contrast medium downward. The maintenance of a uniform pressure during the injection is important. The author devised an apparatus permitting the injection of 25 c.c. of the opaque medium per second under a constant pressure of 15 pounds. The first roentgenogram is made when 40 c.c. of the solution have been injected, and the second one immediately afterward. The trocar is then withdrawn, a suture is placed in the adventitia of the artery and the wound is closed. The administration of phenobarbital the night before and of morphine hypodermically, one hour prior to the injection, helps in obtaining better relaxation.

The method is of value in syphilitic arteritis showing dilatation or obliteration of the arteries and the different types of aneurysm, in arteritis obliterans, in degenerative lesions which occur more commonly at the end of the abdominal aorta, and in the iliac arteries, leading to dilatation, elongation or tortuosity of the vessels, and often associated with calcium deposition. The author was even able to observe valvular kinks that retarded the circulation considerably. Surgical removal of these kinks improved the circulation.

The article is illustrated with some typical roentgenograms. T. LEUCUTIA, M.D.

Meschan, I.: A Roentgenographic Study of Spondylolisthesis, with Special Reference to Stability Determination. *Radiology*, 1946, 47: 249.

The author describes an improved method for the detection of spondylolisthesis and the determination of the slipped vertebral body.

Since a defect of the pars interarticularis is found in most cases of spondylolisthesis an accurate roentgen visualization of this part of the spine is important. The term "pars interarticularis" refers to the isthmus of bone lying between the superior and inferior articular processes. Actually, this segment is a portion of the lamina and separates the vertebral body, pedicles, superior articular processes, and transverse processes from the inferior articular processes and the spinous process. It is best visualized in the oblique view. In case of bilateral defect the detection is usually made in straight lateral views, the vertebral body becoming susceptible to anterior displacement.

The fact that the posterior margin of the slipped vertebral body bears a definite relationship to the posterior margins of adjoining vertebral bodies can be used to measure spondylolisthesis quite accurately. Routine roentgenograms of the lumbosacral spine are made in recumbent anteroposterior, lateral, and both oblique views. When defects of the pars interarticularis are found, additional roentgenograms are made in erect positions, with the patient standing straight, flexing the spine, and extending the spine. The lateral projections are used to measure the degree of spondylolisthesis. Four landmarks are chosen: A is the posterior inferior lip of the vertebral body above the one in question; B is the posterior superior.lip of the vertebral body below the one in question; C is the posterior lip of the superior surface of the involved vertebral body, and D is the posterior inferior lip of the involved vertebral body. Lines are drawn through AB and CD and extended until they intersect if possible. Occasionally they will appear parallel or superimposed. The intersection in the normal almost invariably occurs at the level of, or below, the vertebral body in question. In spondylolisthesis the lines intersect above the vertebral body in question. The author designated from 10 to 20 degrees as indicative of slight slipping, from 10 to 20 degrees of moderate slipping, and of more than 20 degrees of severe slipping. If the lines are parallel, they are 3 mm. or less apart in the normal, up to 1 cm. apart in slight slipping, from 1 to 2 cm. apart in moderate slipping, and more than 2 cm. apart in severe slipping. The instability of the slipped vertebra is detected by studying the degree of anterior displacement in the various positions of the spine. A variation greater than 2 millimeters or 2 degrees is considered relatively significant of instability.

The number of cases examined by the author from April 19, 1942 to March 10, 1944 are divided into two series. The first includes 1,131 cases seen during a period of 22 months while the hospital was in a rear echelon, and the second 520 cases seen during a period of 6 months while the hospital was in a forward echelon. For various reasons, which the author expounds in detail, this latter series is the more representative. Whereas in the first series defects of the pars interarticularis were noted in 5 per cent of the total, in the second series they were noted in 11.7 per cent. Correspondingly, the cases of spondylolisthesis, or borderline spondylolisthesis, increased from 3.6 per cent to 6.5 per cent. Stability studies were made in 44 per cent of the cases of spondylolisthesis of the first series and in 82 per cent of the second which gave an incidence of instability of 39 per cent and 50 per cent, respectively.

The most frequent sites of involvement were the fifth lumbar vertebra, in 73.7 per cent of the cases, and the fourth lumbar vertebra in 14.7 per cent.

Bilateral defects of the pars interarticularis occurred more than twice as frequently (69 per cent) as unilateral defects. Approximately three-fifths of patients with bilateral defects had definite spondylolisthesis, one-fifth had borderline spondylolisthesis, and the remaining one-fifth had no spondylolisthesis. One half of the slipped vertebral bodies were shown to be unstable under conditions of stress, but even if

no instability could be demonstrated the presence of localized lipping, sclerosis, and apophyseal joint changes indicated strain upon the adjoining supporting structures.

The article is abundantly illustrated with diagrams and typical roentgenograms.

T. LEUCUTIA, M.D.

Scott, L. D., and Tarleton, G. J.: Pyridoxine Hydrochloride (Vitamin B_6) in the Control of Radiation Sickness: Preliminary Report. *Radiology*, 1946, 47: 386.

In 1941 the authors installed a shock-proof, 220 kv. p. roentgen therapy unit, yielding an output of 50 r/min. with 200 kv., 0.5 mm. of copper plus 1 mm. of aluminum filtration at a distance of 50 centimeters. This output permitted the irradiation of a patient with larger daily doses than was the custom formerly, a fact which, on the other hand, led to more pronounced radiation sickness.

Since that time, to combat the radiation sickness, the authors administered 50 mgm. of nicotinic acid t. i. d. routinely to all patients receiving 200 kilovolts of roentgen therapy.

In April, 1945, another change was made. In order to shorten the rather long duration of the series of irradiation, the daily dose was raised from 300 to 600 roentgens. In this manner the treatment time for various types of malignant growths was reduced by approximately one-half. To overcome the radiation sickness incidental to the additional increase of the dose, the authors started to give 25 mgm. of pyridoxine hydrochloride intravenously after each roentgen treatment, supplementary to the nicotinic acid.

The method was used in 35 cases. The first 20 of these are presented in tabulary arrangement. The development of radiation sickness was prevented in nearly all of the patients. T. LEUCUTIA, M.D.

Glenn, J. C., Jr., and Reeves, R. J.: Treatment of Radiation Sickness with Trasentine and Trasentine-Phenobarbital: Preliminary Report. *Radiology*, 1946, 47: 392.

A number of articles dealing with the value of vitamins, particularly thiamine chloride, pyridoxine, and nicotinic acid in the treatment of radiation sickness, have appeared in the literature. Jenkinson and Brown called attention to the possible value of amphetamine and d-desoxyphedrine.

Wallace, after roentgen studies on a series of patients receiving roentgen therapy over the pelvis, reported changes strongly suggesting that the immediate cause of the nausea, diarrhea, and abdominal pain may be intestinal and sphincter spasm. With this possibility in mind, the authors tried antispasmodic therapy for the purpose of relieving the symptoms.

The present preliminary report refers to 65 unselected patients so treated. They are arranged in an all-inclusive table. The antispasmodic drug was trasentine (75 mgm. per tablet) which was given alone in the first 26 patients, the total dosage ranging from 225 to 1,000 mgm. per day (1 to 3 tablets 3 to 4 times a day). A second group of 32 patients received trasentine-phenobarbital tablets (20 mgm. of trasentine plus 20 mgm. of phenobarbital) at the rate of from 1 to 2 tablets 3 times a day. Finally, a third group of 7 patients, including mostly patients with nausea and diarrhea, were treated with a combination of trasentine-phenobarbital (1 tablet 3 times a day), and trasentine (1 to 3 tablets 3 to 4 times a day).

The conclusion is reached that trasentine and trasentine-phenobarbital are valuable adjuncts in the treatment of radiation sickness. No toxic effect was noticed, but trasentine had a tendency to depress the appetite to some degree.

T. LEUCUTIA, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Barcroft, H., and Edholm, O. G.: Sympathetic Control of the Blood Vessels of Human Skeletal Muscle. *Lancet*, Lond., 1946, 2: 513.

The question whether or not the sympathetic nervous system supplies the blood vessels in muscle and maintains vasoconstrictor tone during muscular inactivity is of fundamental importance in peripheral vascular disease. Animal investigations on the whole seem to point in that direction. Sympathetic nerve endings have been identified histologically in the walls of blood vessels in cat muscle. Increase in the blood flow through muscle in the dog and cat has been observed after section of the sympathetic nerve supply. Nevertheless, general opinion is against the presence of sympathetic tone in the vessels in human muscle. Recent work in Belfast, however, has convinced the author that such tone exists, and a summary of the evidence is submitted.

The technique of demonstrating sympathetic vasoconstrictor tone in the blood vessels of human skeletal muscles is described.

The blood flow in muscles is more than doubled by the release of sympathetic tone. Heating the body relaxes the vasoconstrictor tone in the blood vessels supplying muscles. Vasoconstrictor tone gradually returns to the blood vessels of sympathectomized subjects. Vasodilatation takes place in the muscles of the forearm after fainting, except in sympathectomized subjects. Therefore, this vasodilatation is due to nervous control. It is shown that vasodilatation in the forearm muscles is not due merely to removal of vasoconstrictor tone, but that it is, at any rate in part, mediated by vasodilator nerves.

JOHN E. KIRKPATRICK, M.D.

Liebow, A. A., MacLean, P. D., Bumstead, J. H., and Welt, L. G.: Tropical Ulcers and Cutaneous Diphtheria. *Arch. Int. M.*, 1946, 78: 255.

Ulcerative lesions of the skin are frequent in the tropics, and virulent Cornybacterium diphtheriae are often isolated from them. Diphtheritic ulcers have been described by many with a host of different terms: erythema, desert sore, Veldt sore, garigha, etc. They are significant because of their source of Cornybacterium diphtheriae, their relation to nasopharyngeal diphtheria, their sequelae of myocarditis and neuritis, and because of the symptoms from the skin condition per se. Although only 1 per cent of cases of nasopharyngeal diphtheria in the temperate zones develops cutaneous diphtheria, in the middle East and northern India, diphtheritic lesions of the skin occur frequently and out of proportion to the cases of nasopharyngeal diphtheria. In these regions it appears endemic. This is true of military personnel foreign to these regions as well as of the natives. Such lesions were commonly observed during both the first and the second world wars.

An extensive study was made of diphtheritic ulcers found in 174 patients involving men from Saipan, the Solomon Islands, and Leyte. In addition, Schick tests were done on many natives in these areas. A comprehensive record of each soldier was taken; intense parasitological and bacteriological studies were made; cultures of the ulcer, nose, and throat were taken; Schick tests and examinations to disclose neurological lesions, were carried out.

Tryptose agar without dextrose, and containing 5 per cent of human blood, was employed as a culture medium. Direct examination of the ulcer exudate was done and an attempt made to predict the subsequent bacteriological investigation. In one group the presence of Cornybacterium diphtheriae was correctly diagnosed in 83⅓ per cent of the cases. Certain aspects of culturing were emphasized:

1. Cornybacterium diphtheriae grows better on a slightly alkaline medium (about *p*H 7.6).

2. Cornybacterium diphtheriae closely resemble certain other hemolytic cornybacterium common in these locations, which were probably C. ovis and C. pyogenes, but which the authors have designated as Cornybacterium hemolyticum. Although these appear alike on Loeffler's medium, on blood agar plates the colonies have large zones of beta hemolysis surrounding them.

3. By testing for toxigenicity by the intracutaneous inoculation of guinea pigs and rabbits, 84.1 per cent of the hemolytic cornybacterium proved toxigenic. The atoxic forms were relatively more common in carriers. All strains of the nonhemolytic cornybacterium proved nontoxigenic.

Cornybacterium diphtheriae was found concomitantly with diphtheroids, beta hemolytic streptococcus, Cornybacterium hemolyticum, Staphylococcus albus and aureus. The older ulcers yielded relatively fewer toxic bacilli than the more recently acquired ones.

Regardless of the wide geographic distribution of these ulcers, a remarkably similar appearance was present among them. Usually a history of trauma or insect bite could be elicited, and in the majority of instances the troops were active rather than resting. The initial lesion, for example a scratch, began to enlarge instead of healing; later it deepened and the edges, first red and edematous, became rolled. Granulations failed to rise, but the bottom necrosed continuously, causing the ulcer to be rounded or serpiginous, indolent, and treatment-resistant. Usually, about the sharply defined sore there was a zone of induration, erythema, and violaceous pigmentation. In atypical cases the condition developed in pre-existing epidermophytosis. The lesions were multiple in 75 per cent of the cases and appeared on the extremities in 99 per cent.

Cornybacterium diphtheriae was occasionally isolated in shallow ulcers, impetiginous dermatitis, chronic paronychia, desquamative and ulcerative dermatitis, and unexplained sinus tracts of the feet.

In a large number of instances it was possible to predict from the clinical appearance of the lesion whether or not Cornybacterium diphtheriae would be found, although it is emphasized that the lesion is not pathognomonic.

Complications noted as occurring in patients with diphtheritic ulcers were:

1. Unexplained tachycardia without electrocardiographic changes or fever. This disappeared when the ulcers healed.

2. In 2 patients with a positive Schick reaction a striking erythema and edema occurred about the ulcers following antitoxin administration. This is comparable to the Francis reaction noted in pneumococcic infections.

Numerous troops were tested for the Schick reaction in order to determine the relation between the test and the incidence of ulcer. The percentage of patients with diphtheritic ulcers reacting positively to the test was approximately twice that of persons who reacted positively in general.

In 174 patients with cutaneous diphtheria, nose and throat cultures revealed Cornybacterium diphtheriae in 19 instances. Of these, 10 had clinical pharyngeal diphtheria and 2 had fibrinous rhinitis. There were 6 pharyngeal carriers and 1 nasal carrier. In these patients ulcers generally antedated the upper respiratory infection.

Many cases of peripheral neuritis and pharyngeal and ocular palsy were seen in the Pacific area hospitals, a few of which were associated with nasopharyngeal diphtheria. The authors state that neuritis can also be secondary to cutaneous diphtheria. In instances of cutaneous diphtheria, the cranial nerves were rarely involved. The symptoms of diphtheritic neuritis secondary to cutaneous lesions were those of paresthesias followed by weakness of the extremities. The deep reflexes were decreased or absent. Proprioception was often disturbed. The spinal fluid protein was elevated and although pleocytosis was not observed, changes in the Lange curves were frequent.

Hospitalization, isolation, bed rest, and moist dressings were the most commonly used procedures for treatment. Patients treated in the Out Patient Department with sulfonamide pastes and dry dressings continued to have their ulcers for many weeks and served as a prolific source of Cornybacterium diphtheriae. The final treatment of choice consisted of bed rest and the application of an isotonic solution of penicillin to the ulcers.

Ulcers containing atoxic organisms healed more rapidly than those with toxigenic bacilli. Serum treatment did not seem beneficial. The authors state that antitoxin should be used as it acts as a prophylactic in preventing the serious complication of nasopharyngeal diphtheria. In cases in which antitoxin was given late, it did not prevent neuritis. Locally applied penicillin caused the gram negative bacillary flora to replace the gram positive organisms. Cornybacterium diphtheriae, although sensitive to sulfonamides in vitro, was not affected by these drugs when they were placed in the ulcers. Other special forms of treatment included the application of casts to secure immobilization, excision of the ulcer, and skin grafts, although these usually failed to take.

Considerable evidence has accumulated that cutaneous diphtheria is an important source of the spread of bacilli to the nose, throat, and skin. In 7 persons diphtheritic infections developed before ulcers were recognized as being due to Cornybacterium diphtheriae. These cross infections included diphtheritic paronychias, abscesses, pharyngitis, and nasopharyngitis.

The incidence of diphtheritic ulcers exceeds that of nasopharyngeal diphtheria and carriers. Among patients with diphtheritic ulcers the incidence of carriers was much higher than in the general population. The authors suggest that troops returning from areas endemic for cutaneous diphtheria may serve as carriers for spread to the civilian population. The existence of large reservoirs of diphtheria in the tropical natives was demonstrated. The high incidence of cutaneous diphtheria accounts for the gradual immunization of the natives and the early age at which this process occurs. The frequent occurrence of diphtheria in the tropics is due to (1) the warm, moist condition of the skin; (2) the intimacy among the population; and (3) the unhygienic state due to infrequent washing.

C. Frederick Kittle, M.D.

Cantarow, A., Paschkis, K. E., Stasney, J., and Rothenberg, M. S.: The Influence of Sex Hormones upon the Hepatic Lesions Produced by 2-Acetaminofluorene. *Cancer Res.*, 1946, 6: 610.

The observation of the susceptibility of the stimulated goitrous thyroid to the tumor-producing action of the carcinogen 2-acetaminofluorene suggested an investigation of the influence in this connection of other agents that stimulate the growth of specific tissues. For this purpose androgenic and estrogenic hormones were chosen.

Excessive quantities of an exogenous or endogenous estrogen and androgen were found to accelerate and intensify the development of cystic and neoplastic hepatic lesions induced in Sherman rats by 2-acetaminofluorene. In the authors' opinion this phenomenon may be related to the role of the liver in the intermediary metabolism and excretion of the sex steroids. It is interesting to note that thiouracil appeared to exert a strikingly protective action on the liver as far as the development of both cystic and neoplastic lesions is concerned.

In rats receiving thiouracil simultaneously with the carcinogen, no tumors occurred in the hyperplastic target organs of the sex hormones, in sharp contrast to the high incidence of tumors of the thyroid gland. The authors advance the following hypo-

thesis: the fact that hyperplasia induced by the sex hormones is a functioning hyperplasia, while that induced in the thyroid by thiouracil is functionless, may possibly be a determining factor in the relationship between simple and neoplastic growth of tissue.

JOSEPH K. NARAT, M.D.

Hughes, R. R.: Post-Penicillin Jaundice. *Brit. M. J.*, 1946, 2: 685.

While working in a military general hospital in India, the author noted that a large number of patients with infective hepatitis admitted to the medical ward gave a history of having received a course of penicillin injections within the previous 7 months. Post-penicillin jaundice was likened to post-arsphenamine jaundice.

It was concluded that the condition was transmitted from patient to patient by means of contaminated syringes. Experiments were carried out, and the mechanism by which the contamination occurred was discussed.

C. FRED GOERINGER, M.D.

Hueper, W. C.: The Significance of Industrial Cancer in the Problem of Cancer. *Occup. M.*, 1946, 2: 190.

Occupational cancer is of great importance not only as a public health problem, but also because it may be considered as a human equivalent of experimental cancer in animals.

Exogenous carcinogenic factors may elicit malignant growths through one of the following three mechanisms:

1. The first group of occupational carcinogens consists of agents which apparently cause a cancerous cellular transformation by acting directly on the cellular substrate. Substances contained in tar, pitch, asphalt, soot, mineral oil, and those represented by certain aromatic amines (benzidine, aniline) may serve as examples.

2. The second group is formed by agents which exert carcinogenic properties indirectly by changing some normal chemical constituent of the cells or tissue fluid in such a way that it becomes endowed with carcinogenic properties. This mechanism may be active in the development of cancers caused by radiating energy, nickel, asbestos, and arsenic.

3. In a third group those carcinogens are found which have neither primary nor secondary blastogenic properties, but which elicit functional disturbances in certain organs such as the liver, pituitary, adrenal glands and the gonads. The functional abnormalities may in turn lead to the development of circumstances possessing carcinogenic qualities.

The age factor represented by the relative age or the average life span has no significant part in determining the degree of susceptibility to carcinogenic agents.

There is no concrete evidence that a genetic predisposition plays an important role in the incidence of occupational cancer.

A multicentric development of cancer is frequent with occupational carcinogenesis. This phenomenon has been observed in from 15 to 30 per cent of industrial carcinomas. The excessive frequency of primary multiplicity of occupational cancers is evidently an expression of a relatively powerful carcinogenic stimulation.

JOSEPH K. NARAT, M.D.

DUCTLESS GLANDS

Ralli, E. P.: Factors Affecting Survival in Adrenalectomized Rats. *Endocrinology*, 1946, 39: 225.

In the course of studies on the alteration of melanin metabolism in adrenalectomized black rats maintained on diets deficient in the filtrate factors of vitamin B, it was observed that survival after adrenalectomy was greatly prolonged when the diets were supplemented with a rice bran extract. The author's present report is concerned with the comparative effects of adrenocortical extract, desoxycorticosterone acetate, and calcium pantothenate, with or without 1 per cent sodium chloride solution, on the survival of adrenalectomized black rats.

Experiments were made in which black rats that were fed diets deficient in pantothenic acid were adrenalectomized. Following adrenalectomy one group of animals was given a 1 per cent sodium chloride solution and continued on the deficient diet alone, on the diet and injections of the adrenocortical hormone or desoxycorticosterone acetate, or on the diet supplemented with calcium pantothenate. The second group of animals was treated in a similar manner, but no sodium chloride was given.

When the sodium chloride was omitted, regardless of hormone administration or dietary supplement, the survival was sharply curtailed. When 1 per cent sodium chloride was given the addition of calcium pantothenate to the diet resulted in a remarkably long period of survival, 50 per cent of the animals surviving for 150 days. The survival with calcium pantothenate and sodium chloride was longer than that obtained when the rats received hormone therapy plus sodium chloride and the deficient diet. The importance of sodium chloride to the survival of the pantothenic acid treated adrenalectomized rat was shown by the fact that withdrawal of salt resulted in death.

HARRY W. FINK, M.D.

EXPERIMENTAL SURGERY

McCall, J. W., and Hoerr, N. L.: Reinnervation of a Paralyzed Vocal Cord. *Laryngoscope*, 1946, 56: 527.

This article is a preliminary report on the results, in the experimental animal, of nerve suture after vocal cord paralysis, and submission of a method for regeneration of the recurrent laryngeal nerve by means of anastomosis to the vagus nerve.

Paralysis of one vocal cord only does not endanger life. Voice weakness, voice change, and frequent clearing of the throat characterize this condition. Pressure on the vagus or recurrent laryngeal from a tumor in the neck or mediastinum is a frequent cause of vocal cord paralysis.

Paralysis of both vocal cords endangers life, for if both cords are paralyzed they assume the median position and close the glottis. The paired posterior cricoarytenoids are the only abductor muscles of the larynx, and when they are paralyzed the patient cannot open the glottis on inspiration. If the cricoarytenoids do not open the glottis on inspiration, the flaccid cords are drawn closer together by the inspired current of air, which causes the inspiratory crowing sound which is typical of bilateral abductor paralysis. Thus, it is an inspiratory dyspnea. The patient has no difficulty with expiration, as the force of the current of air is strong enough to separate the flaccid cords enough to expel the air.

Contrary to general belief, there is little voice change in bilateral abductor paralysis. There is not as much voice alteration in bilateral vocal cord paralysis as in unilateral paralysis, because in bilateral paralysis the vocal cords assume the median position.

Thyroid disease and the sequelae of thyroidectomy are the most frequent causes of bilateral paralysis. Neurological conditions such as cerebral lues are the next most frequent cause. During a thyroidectomy, the recurrent laryngeal nerves may be severed, or they may be so constricted by scar tissue postoperatively as to cease to function.

The operative procedures for the relief of bilateral abductor paralysis necessitate a certain amount of mutilation of the larynx. If the breathing is improved, the voice is impaired. Hence, if short-circuiting of an injured recurrent laryngeal nerve by anastomosing the vagus to the recurrent peripheral to the lesion is accomplished, it would render a mutilation of the larynx unnecessary and restore the normal function of the vocal cord.

The recurrent laryngeal nerve is usually injured in the region of the inferior thyroid artery, so an approach to the recurrent nerve should be above the point where it had been severed or compressed. The recurrent laryngeal nerve leaves the groove behind the trachea and esophagus and turns laterally in the neck to enter the larynx just below the inferior cornu of the thyroid cartilage. This is above the point where it is usually injured. With a collar (horizontal) incision about 1 cm. below the cricoid cartilage, beginning lateral to the sternomastoid on the side to be done and extending the incision across the midline of the neck, the recurrent nerve is identified and isolated as far down in the neck as possible. The sternomastoid is retracted laterally, and the vagus is identified, dissected as far as possible in the neck, and is severed and drawn under the common carotid and strap muscles. The recurrent nerve is then severed. The vagus stump is usually long enough to suture to the recurrent stump without tension and the finest arterial silk suture that can be obtained is used.

The operation was performed on 4 dogs with good results in 3; the failure was believed to be due to the use of too large suture material and faulty technique. In the other 3 dogs the vocal cord movements were effective and permitted a normal bark.

STEPHEN A. ZIEMAN, M.D.

Kershner, D., Hooton, T. C., and Shearer, E. M.: Production of Experimental Portal Hypertension in the Dog; Anatomy of the Hepatic Veins in the Dog. *Arch. Surg.*, 1946, 53: 425.

Venous congestion of the liver, by constriction of the posterior vena cava anterior to the kidneys, has previously been produced. Death usually follows in from 5 to 10 hours after the complete ligation of the cava just above the renal veins. If the animal survives, such a procedure results in congestion, not only of the hepatic and portal systems, but also of the systemic regions drained by the cava, caudad to the obstruction, particularly the kidney.

The present work was undertaken with the object of producing hepatic congestion and accompanying portal hypertension in the dog, without the associated congestion of the systemic regions. A procedure has been devised for the production of venous congestion in the dog mechanically, a 3 stage operation. This method has the advantage of avoiding congestion of the systemic regions caudad to the occlusion. It does so by taking into account the complex nature of the relationship between the hepatic veins and the posterior vena cava, and by making use of the collateral circulation from the caudad regions of the body to the heart, thus preventing caudal congestion.

That portal hypertension occurs in animals subjected to the operational procedure described has been noted in extensive physiological studies carried out on many of the dogs, especially on the 4 animals that survived all the operations. The portal pressure is increased after the first operation. By partial occlusion of the postcaval vein, caudad to the liver, increased portal resistance is built up, and the blood is forced into channels which are inconspicuous under normal conditions. These anastomoses connect the portal and systemic veins, and thereby promote a path for the return of blood from the splanchnic area to the right side of the heart. When the new collateral circulation has developed, stage 2 can be performed, with minimum damage to the kidneys. When stage 3 of the operation has been performed, the portal pressure is increased still further. With an original pressure of about 8 cm. of water, there is no filtration from the capillaries into the abdominal viscera. With an increased pressure of 15 cm. or more of water, there is increased filtration. The slow rise in pressure is evidenced by the latent period of the development of ascites, after the posterior vena cava has been partially occluded below the heart. Ascites in these animals was not observable until 7 to 20 days after operation. Increasing quantities of ascitic fluid were then formed, as measured by changes in weight and by the large amounts of fluid that could be withdrawn.

Forty-six dogs were used in the experiments. The operative procedure is described.

SAMUEL KAHN, M.D.

Blaine, G.: The Uses of Plastics in Surgery. *Lancet*, Lond., 1946, 2: 525.

Plastics are chemical substances of high molecular weight. They are deformable and under suitable conditions retain an acquired shape. They are versatile since the end product can be given different physical properties; for instance, some plastic might be made into a very hard object, a flexible mass, an adhesive film, or even into a yarn. They doubtless will make new surgical procedures possible. Generally, they are grouped according to their physical and chemical behavior and divided into absorbable and nonabsorbable materials, according to living tissue reaction. A few interesting facts follow.

Of the plastics used in bone surgery, acrylics have been found most useful. Despite little reaction early, they tend to become loose, often after 6 months, although no tendency to "work themselves out" has been observed.

Acrylics are currently used with the "dental impression" technique. This necessitates a 2 stage operation, the first stage being the taking of the impression, and the second, the fitting of the prosthesis. The technical difficulties of this procedure led to the 1 stage operation, which may be done in one of two ways. The first consists of the "setting" of "activated" acrylic dough by means of the ultraviolet ray. The second method makes use of the "thermoplastic" properties of the preformed unplasticed methyl methacrylate sheet. This sheet heated to 130° C. and while soft, is molded into the exact shape desired. This shape is retained on cooling. Either of these methods can be completed within 15 or 20 minutes.

Acrylic "jointcaps" have been used in the treatment of arthritis of the hip and in the reconstruction of the small joints of the hand. Acrylics have been used as spinal jackets and they have been used as Gunning splints in the treatment of fractures of the edentulous jaw.

Some of the disadvantages of acrylics are that the temperature at which the plastic is moldable is quite uncomfortable for the patient and the operator; they do not absorb moisture and therefore allow sweat to accumulate, pruritus to develop, and a foul odor to manifest itself. Occasionally, a severe dermatitis has resulted.

Acrylic contact lenses and artificial eyes do not break easily but are very easily scratched and are rather expensive. The polyvinyl plastic substances have been used as drainage tubes, for anesthetic airways, and for soft tissue prostheses, but they cannot be worn indefinitely and are photosensitive. Plastic chemistry has introduced the very popular "nylon" suture material.

The greatest use of the absorbable plastics has been in the field of hemostasis. Such articles as oxidized cellulose, fibrin foam, and gelatin foams have proved of great value surgically.

The latest development in absorbable plastics is a derivative of seaweed, known collectively as the alginate group. Certain alginate products are absorbable in tissue, sterilizable by heat, and compatible with penicillin. They have been found satisfactory as "puncture patches" over scleral defects. Alginate gels have been reported useful in the sealing of bronchi in the surgical treatment of pulmonary tuberculosis.

LOUIS T. BYARS, M.D.